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WILKINS (V. E.). **Report of the International Conference on virus diseases of Citrus (Acireale, Sicily, 15–17 Sept. 1959).**—103 pp., 3 pl. (10 fig.), Paris, European and Mediterranean Plant Protection Organisation, 1960. 6 Frs. [With Fr. version.]

This Conference discussed a report (appendix I) by I. REICHERT on citrus virus diseases in Mediterranean countries, made as a result of a suggestion by the Working Party in 1956 [**36**, 526]. Appendix II contains additional information and proposals; appendix III comprises the individual reports on the 7 countries visited.

Tristeza virus [cf. **38**, 258, 596 *et passim*; map 289] cannot as yet be considered as a disease of Mediterranean countries. Among commercial trees only the sweet orange was seriously suspected of being infected. Suspect trees were found in Greece (Arta Province), Italy (Fondi Province), and France (near Antibes), but even if they are shown to be infected by tristeza the disease will not present any real danger in the absence of an efficient vector.

Xyloporosis [cf. **39**, 170, 309; map 374] was the predominant virus disease, but not to the same degree in all countries. Mandarin vars. frequently showed the typical markings; the most tolerant and thriving cultivars were Setubalense and Carvalhais in Portugal and Avana in Italy, even though showing symptoms. The most severely affected mandarins were found in Greece. In Portugal, where sweet oranges are grown as seedling trees, certain plantations of these were severely affected, the disease causing a serious decline. Individual affected seedling trees of sweet orange were also seen in Italy and Spain, but of sour orange only in Cyprus and Spain. Trees attacked by insects, especially scale insects, were much more affected than unattacked and trees infected by fungi showed more xyloporosis than others. In all countries heavy soil, especially when over-irrigated, was the chief factor favouring xyloporosis of orange trees. The presence of xyloporosis markings does not necessarily imply that the trees will decline; most do well. Sweet orange tops and sour orange stocks in the E. Mediterranean (Cyprus, Greece, Yugoslavia) were always devoid of any xyloporosis markings, whereas tops in the central and W. Mediterranean (Italy, Spain, Portugal, S. France) bore clear marks and the stocks were more or less marked. The rate of xyloporosis infection in sour orange rootstocks ran parallel to that in the sweet orange tops. Sweet orange grafted on sweet lime in Cyprus was totally declining from xyloporosis; in Greece and Italy citron was affected, and in almost all the countries pummelo trees (*Citrus grandis*) on sour orange, which produced lop-sided fruits. Trifoliate orange (*Poncirus trifoliata*) stocks in Yugoslavia and Italy bore xyloporosis markings in the cambium region. The cachexia form of xyloporosis [cf. **39**, 310] was confined to mandarin vars.

Psorosis virus disease [**39**, 470] occurred only sporadically in most of the countries: only in Spain was it an important problem and there only on the foreign vars. Washington navel and Valencia. G. S. PLANES stated (p. 49) that psorosis was the most widespread virus disease present in the orange-growing regions of Spain, attacking all vars. of sweet orange, though chiefly in navels.

Exocortis virus disease [map 291], apparent only on trifoliate orange stock, was found only in Yugoslavia and Italy; the trees were stunted and shell bark was present at the rootstock. G. RUGGIERI stated (p. 53) that the disease is widespread in Italy on this stock and was found in a spectacular form in the district of Messina. He considered that latent exocortis is present in all the Italian citrus vars. investigated.

A chronic decline virus disorder [cf. **36**, 693] was found in sour orange seedling

trees growing in large plantations near Seville (Spain). There was severe inverse pitting in the trunks.

New for the Mediterranean area were (1) lemon sieve tube necrosis virus [cf. **35**, 366], inducing a general decline, which appeared to cause heavy losses in Italy and Spain; and (2) sour orange rootstock necrosis virus [cf. **35**, 365] in Italy, causing a declining appearance of young sour lemon tops, yellowing of the leaves, and over-growth of the union. Considerable importance is attached to the proposal by the Italian Govt. (p. 43) to establish a citrus quarantine station on the Lipari Islands, N. of Sicily.

G. Ruggieri, discussing the present position of citrus virus diseases in Italy (p. 53), stated that 'impietratura' or hardening of fruits is probably a virus disease as it was transmissible by grafting. A particular form of 'infectious chlorosis' was reported by Dr. Russo of Acireale Research Sta., who found it in some citrus groves in Apulia; inoculation experiments demonstrated that the chlorosis was infectious.

Bugiani (A.), Scrivani (P.), & Loprieno (N.). **Indagini sul parasitismo da Deuterophoma tracheiphila Petri.** [Researches on parasitism by *D. tracheiphila*.]—24 pp., 1 col. pl. (4 fig.), 11 fig. (9 col.), Milan, Società Montecatini, 1959. [Fr., Engl., Germ. summ. 74 ref.]

Studies at the Istituto di Ricerche Agrarie, Laboratorio di Signa, Florence, showed that *D. tracheiphila* [**38**, 83], when inoculated into the base of young stems or branches of potted sour orange seedlings, reaches the tip in a few days, before symptoms of chlorosis appear on the apical leaves. Hyphae and conidia were seen in invaded tracheids, the mycelium apparently being confined there, but gum-like occlusions, which appeared later, were also present in the xylem parenchyma and fibres and the medullary rays; the occlusions greatly reduce water flow.

The authors consider that the gum secretion is a non-specific reaction by the host. The plugging was reproduced by wounding or with pectic enzymes, but the effects remained strictly localized. The specific discoloration of infected wood appears to result from the presence of gummy matter, and the red pigment secreted by the fungus *in vitro* was not seen *in vivo*, where the hyphae were invariably hyaline.

Moreau (C.). **Altérations fongiques des Agrumes en entrepôt.** [Fungal spoilage of Citrus in storage.]—*Études d'outre mer*, **42**, 4, pp. 141–145, 6 fig., 1959.

Notes are given on the fungal diseases of citrus and their agents occurring in cold storage in France [**35**, 447]. In descending order of importance these are: *Penicillium digitatum*, *P. italicum* [**36**, 98], *Phytophthora parasitica*, *Geotrichum candidum* var. *citri-aurantii*, *Phomopsis* [*Diaporthe*] *citri*, *Alternaria citri*, and 4 other spp. of fungi causing minor damage. Sources of contamination are dealt with briefly and practical notes on control given.

Outbreaks and new records.—*F.A.O. Pl. Prot. Bull.*, **8**, 1, pp. 11–12, 1 fig., 1959.

T. T. Reyes, Univ. Philippines, Laguna, states that a disease resembling virus ringspot of coffee [cf. **38**, 320] or blister spot [cf. **38**, 144] was 1st noted in Aug. 1957 on a few Arabica and Excelsa coffee trees at Laguna. By Apr. 1959 it was already prevalent in the plantation, also affecting Robusta and Liberica, and very severe on the 1st three. Both seedlings and bearing trees are affected, the leaves, fruits, stems, and twigs being attacked. On the leaves are circular translucent spots, from pinhead size to 1·5 cm. in diam., with a yellowish border and a single, concentric or incomplete necrotic ring; they may coalesce. In the centre of a spot a ring surrounds apparently normal tissue. Affected fruits turn black and are usually small. Transmission from diseased to healthy coffee plants was demonstrated by grafting.

Rayner (R. W.). **Leaf rust.**—*Kenya Coffee*, **25**, 291, pp. 85–86, 1960.

With reference to a recent paper on spore dispersal of coffee leaf rust [*Hemileia vastatrix*: **39**, 311], the author states that in the greenhouse if infected leaves are tapped a cloud of spores is liberated but soon settles; he considers that liberation is largely brought about in the field by rain striking the leaves [cf. **37**, 513; **38**, 517]. The spores reach the under surface of the leaves by rain splashing. A field trial demonstrated the importance of a spray immediately before the 'long rains', while another spray, 4 weeks later, was found to be very useful [**39**, 412]. Reduction of inoculum in Jan.–Feb. is likely to give adequate control only if conducted over a reasonably large area [**39**, 456].

Echandi (E.). **La chasparria de los Cafetos causada por el hongo Cercospora coffeicola Berk. & Cooke.** [The Coffee disease 'chasparria' caused by the fungus *C. coffeicola*.]—*Turrialba*, **9**, 2, pp. 54–67, 10 fig., 1 graph, 1959. [Engl. summ.]

At the Dept de Fitopatología, Facultad de Agronomía, Univ. Costa Rica, *C. coffeicola* [**35**, 890] sporulated well on carrot leaf decoction agar [**35**, 697]. Opt. temp. for growth was 24° C. and for spore germination 30°. High R.H. is required for sporulation and spores germinated only when immersed in a film of water. All the 134 vars. of 5 coffee spp. examined at Turrialba had symptoms; of 12 inoculated weeds, *Ricinus communis* and *Leonurus sibiricus* developed numerous leaf spots. In coffee the fungus penetrated the stomata, more in unshaded than in shaded plants, and infection spread in from the epidermal cells. Plants in the open exposed to both sun and dew developed more necrotic spots than the ones receiving sun or dew alone, while shaded plants were the least affected. Wilting induced by withholding of water enhanced symptom expression. Coffee trees planted close together had fewer spots than those far apart. Conidia are disseminated by water but can also be airborne.

Van Emden (J. H.) & Van Suchtelen (N. J.). **Zeefvatenziekte en koffiekanker.** [Phloem necrosis and Coffee canker.]—*Surinaam. Landb.*, **7**, 4, pp. 111–114, 1959. [Engl. summ.]

Previous studies are reviewed and the results of further investigations at the Landbouwproefstation, Paramaribo, in 1958 briefly reported. *Ophiostoma coffeae* [*Ceratocystis fimbriata*: **35**, 181] was detected in many of the wilting and dead trees inspected (a common condition in Surinam) but the majority were free from fungal infection. The anatomical abnormalities in bast samples of the remainder agreed entirely with Stahel's descriptions of phloem necrosis [**32**, 68]; flagellates were also present. On the other hand, trees attacked by *C. fimbriata* showed no signs of phloem necrosis.

George (K. V.). **Stem-wasting 'kondlie' disease of Coffee (Part I—Occurrence and symptoms).**—*Indian Coffee*, **23**, 11, pp. 495–496, 502, 2 fig., 1959.

This disease [**39**, 412], 1st noticed in 1955, has caused heavy seedling losses (10–30%, but occasionally 50–75%) since 1957, particularly in the Mysore and Coorg coffee areas. Symptoms appear on 8–11-month-old seedlings in Aug.–Oct. The constricted stems have longitudinal furrows. The tip leaves are yellowish or more commonly coppery bronze. Affected plants are often tall and lanky with long internodes but new suckers may grow normally. If constricted at or below the primary node the formation of thick adventitious roots above the constricted area usually occurs. So far this malady has been observed only on Arabica seedlings, all vars. examined in S. India being susceptible. Some natural recovery by callusing of the constricted area is encouraged by protection from hot sun and maintenance of opt. soil moisture conditions. In nurseries where Bordeaux spraying is frequent

incidence is often high. *Chaetophoma* and *Phoma* spp. are frequently associated and occasionally a *Fusarium* sp., but their role is uncertain.

[A note on this disease also appears in *F.A.O. Pl. Prot. Bull.*, **8**, 2, p. 22, 1959.]

Young (V. H.), Fulton (N. D.), & Waddle (B. A.). **Factors affecting the incidence and severity of Verticillium wilt disease of Cotton.**—*Bull. Ark. agric. Exp. Sta.* 612, pp. 1–26, 1959. [*Biol. Abstr.*, **35**, 6, p. 1,494, 1960.]

Tests in the Mississippi Delta area of Arkansas from 1951–54 and observations during the epidemic outbreak of 1950 indicated that July–Aug. is the critical period when unfavourable weather conditions may lead to serious damage to cotton by *V.* wilt [*V. alboatrum* and *V. dahliae*: cf. **29**, 109; **39**, 312]. Temps. below 80° F., especially if accompanied by heavy rainfall, during these months result in severe outbreaks. Planting in June greatly curtailed wilt. Significant reduction in incidence and significant increases in yield followed the most shallow cultivation compatible with weed control. Raising the beds did not affect incidence [**29**, 302; cf. **30**, 38]. Applications of 6–8–12 fertilizer at 600 lb./acre increased yields and caused only an insignificant increase in incidence. Straight N fertilizers resulted in max. yields but highest incidence, though 1 ton lucerne meal+100 lb. NH_4NO_3/acre gave the highest yields with less incidence.

Gorlenko (M. V.). Вертициллиозное увядание Хлопчатника на повестке дня. [Verticillium wilt of Cotton on the agenda.]—Защ. Раст., Москва [*Zashch. Rast., Moskva*], **5**, 1, pp. 62–63, 1960.

At a conference convened by the Uzbek Acad. Sci. in Oct. 1959 Mme A. I. Solov'eva gave an appraisal of agrotechnical control methods for *V. dahliae* [**39**, 25] and indicated that rotation with lucerne reduced incidence. Rice sown on heavily infected plots was especially effective, the soil being almost entirely freed from infection. Thus, at the Stalin State Farm, Ferghana region, infection was reduced from 80 to 8·3%. The appearance in the cotton fields of more virulent populations of the fungus is reported. This is due to the selection of more aggressive forms on resistant cotton vars. and to simple adaptation to resistant vars. Mme G. M. Kublanovskaya reported on the results of researches on biological control [cf. **38**, 747]. Seed steeping in trichothecin [cf. **37**, 544], or watering the soil with it, gave a twofold reduction of infection. B. P. Straumal suggested that the increased susceptibility of resistant cotton vars. is due to increased infestation of the soil. I. R. Kostenko made the point that infection by *V. dahliae* was reduced from 40–50% to 10–12% following the introduction of resistant cotton vars. Among promising new cotton selections is 153-F.

Wickens (G. M.) & Logan (C.). **Fusarium wilt and root knot of Cotton in Uganda.**—*Emp. Cott. Gr. Rev.*, **37**, 1, pp. 15–25, 1 graph, 1 map, 1960. [15 ref.]

From Namulonge, Uganda, it is suggested that cotton wilt (*Fusarium oxysporum* f. *vasinfectum*) [**39**, 414] probably appeared only recently in E. Africa [cf. **35**, 367; **38**, 381] and is potentially dangerous. In the Eastern Province of Uganda [see below] it is present in the Bukedi and Busoga Districts, where it is closely associated with the root-knot nematode *Meloidogyne incognita* possibly var. *acrita*. The Tanganyika cotton var. Uk 51 has displayed some resistance. DE 715/6M is resistant also to *Verticillium dahliae* [**37**, 237] and has a useful measure of resistance to *Xanthomonas malvacearum*.

It has been shown in the U.S.A. [**38**, 320; *Phytopathology*, **46**, p. 285, 1956] that *F. o.* f. *vasinfectum* can infect cotton plants in the absence of nematodes but that they increase its ability to cause infection, so that measures to build up soil fertility and to reduce nematode infestation by crop rotation are desirable. Seed transmission [cf. **11**, 713; **32**, 186] must be regarded as likely, and steps taken to avoid it.

Arnold (M. H.) & Arnold (Kathleen M.). **Bacterial blight.** Perry (D. A.). **Fusarium wilt.**—*Progr. Rep. Exp. Stas Emp. Cott. Gr. Corp.* (*Tanganyika Territory, Lake Province*), *1958–9*, pp. 8–13; 13–14, 1960.

In trials at Ukiriguru the Albar hybrid E 21/15/504 yielded slightly better than Uk 51 in the virtual absence of bacterial blight (*Xanthomonas malvacearum*) [cf. **39**, 229] and gave a crop worth 49% more than where the disease was present throughout the growing season. In a range of Hg compounds formulated for seed treatment as coloured powders those containing the more toxic alkyl derivative ethyl mercury chloride were clearly more effective against *X. malvacearum* than those based on aryl or inorganic derivatives. Experience has suggested that the higher dressing rates and 1% formulations give the best coverage.

Depth of planting affected incidence, as did soil temp. and moisture during germination and weather conditions after emergence in relation to secondary spread from cotyledon to cotyledon. There was 8% infection when seeds were planted singly, which rose to 62% with 6 seeds/hole. Although variation in planting depth may account for irregular results in seed treatment trials these arise chiefly from the spread of infection between contiguous cotyledons during and after emergence.

X. malvacearum remained pathogenic in trash up to the 3rd week in Dec. though sterilization, in which wetting is the operative factor, was complete by 8 Jan. Trash-borne infection is generally of negligible importance with ridge cultivation, but on flat ground may be important when pre-planting rains are light or planting is early.

Severe outbreaks of *Fusarium oxysporum* f. *vasinfectum* [cf. **39**, 456 and above] are usually associated with continuous cotton cultivation, 5–7 yr. being common. In varietal trials Uk 55 was slightly more resistant than Uk 51 but 3 Alba hybrids in 1 trial were much more resistant than either.

Logan (C.) & Coaker (T. H.). **The transmission of bacterial blight of Cotton (Xanthomonas malvacearum (E. F. Smith) Dowson) by the Cotton bug, Lygus vosseleri Popp.**—*Emp. Cott. Gr. Rev.*, **37**, 1, pp. 26–29, 2 pl. (4 fig.), 1960. [16 ref.]

In experiments at Namulonge, Uganda, adult *L. vosseleri* disseminated *X. malvacearum* to healthy cotton plants in polythene bags in the glasshouse. Typical damage resulted on all such plants. When 2 plants that had been caged with non-contaminated insects were sprayed with the bacterium 48 hr. after the removal of the insects, no bacterial blight lesions developed in the insect-tattered areas though some appeared on the undamaged part of the lamina. Evidently the bacterium must enter soon after injury before a scar forms. The extent of such dissemination in nature remains to be investigated.

Amin (J. V.) & Joham (H. E.). **Growth of Cotton as influenced by low substrate molybdenum.**—*Soil Sci.*, **89**, 2, pp. 101–107, 1 fig., 1 graph, 1960.

At Texas agric. Exp. Sta., College Station, Deltapine cotton plants were grown for 2 generations in 2-l. beakers containing purified nutrient solutions, only 1 group of which was supplied with 1 p.p.m. Mo [cf. **37**, 524]. In the advanced fruiting stage of the F_1, chlorotic growth was observed on some of the plants without Mo, while in the F_2 quantitative differences in development were noted between the 2 series. Deficiency symptoms included interveinal leaf chlorosis, followed by cupping of the leaves with the margins turning downwards, and extensive shedding of the squares and young bolls. There was an accumulation of nitrate N (—Mo group 849·8 p.p.m. as against 18·4 in the +Mo) and a corresponding reduction in the alcohol-soluble amino acids. The total dry wts. of 65-day-old +Mo F_2 plants were 25·62 g. and of the —Mo 14·92 g.

Schneider (R.). **Les défauts de 'points noirs' sur tissus en Coton. Un défaut de 'points noirs' dû á la présence dans le Coton brut d'un champignon microscopique.** [The defects of 'black spots' on Cotton tissues. A defect of 'black spots' due to the presence in the raw Cotton of a microscopic fungus.]—*Bull. Inst. text. Fr., 1959*, 82, pp. 105–110, 10 fig., 1959. [Engl. summ.]

Following a review of various non-mycological causes of these defects, the author reports from the Centre de Recherches Textiles, Mulhouse, France, the detection in samples of cotton fabric from a poplin factory of minute tufts enveloped in a mass of black hyphae and spores characteristic of *Diplodia* [? *gossypina*], an agent of fibre deterioration [**31**, 326]. The stains were resistant to bleaching and appeared on the finished white articles.

Berard (W. N.), Gautreaux (Gloria A.), & Reeves (W. A.). **Reply to Ruperti Letter.**—*Text. Res. J.*, **30**, 1, pp. 70–71, 1960.

Answering Ruperti's criticisms of their formic acid colloid of methylolmelamine method for the production of cotton with outstanding rot resistance [**39**, 383], the authors explain that they had no intention of claiming superiority over all other finishing techniques or priority in the use of the compound. Their purpose was merely to present a practical, effective, and relatively inexpensive procedure requiring only commercially available chemicals and conventional finishing equipment for its application. It is admitted, however, that the finish reduces the initial strength of the fabric by 20–25%.

Doubly (J. A.), Flor (H. H.), & Clagett (C. O.). **Relation of antigens of Melampsora lini and Linum usitatissimum to resistance and susceptibility.**—*Science*, **131**, 3395, p. 229, 1960.

At N. Dak. agric. Exp. Sta., Fargo, rabbit antisera were prepared from globulins acquired from 2 pairs of races of *M. lini* [**39**, 313] (virulent 19 and 22, avirulent 1 and 210) and from 4 vars. (Bison, Cass × Bison 7, Koto × Bison 7, Ottawa 770B × Bison 7) of greenhouse-grown flax plants at the pre-bloom stage. Precipitin tests indicated that each of the 4 rust races and each of the 4 flax vars. was characterized by a specific major antigen, and absorption tests showed that each globulin contained some of the other specific major antigens as heterogenous minor constituents. A rust race was virulent to flax vars. containing its specific antigen as a minor constituent and avirulent to vars. lacking that antigen. No parallel correlation was found for the flax antigens.

Flor (H. H.). **Asexual variants of Melampsora lini.**—*Phytopathology*, **50**, 3, pp. 223–226, 1960.

In further studies at U.S. Dept Agric., Fargo, N. Dakota [cf. above], the pathogenicity genotypes of F_1 cultures of race 22 × race 1 to 25 flax vars. were established. Uredospores from a mixture of 4 F_1 cultures, increased on the susceptible Bison, were screened on flax vars. highly resistant to or immune from the F_1 and the pathogenicity of cultures from each uredium that developed was determined. Of 129 cultures, 118 were race 22, presumably arising from asexual nuclear exchange, the reassociation of a '+' race 22 nucleus of 1 F_1 culture with a '−' race 22 nucleus of another during hyphal fusion in the host. All cultures not race 22 differed from one or another of the F_1 cultures in virulence at 1 additional locus for which that culture was heterozygous. The change in pathogenicity could be attributed to the deletion of a dominant gene or mutation to the recessive in the race 1 nucleus of an F_1 uredospore. The 11 spontaneous mutant cultures included 7 races, 4 new.

Kiss (E.). **Untersuchung der Anfälligkeit von Leinsorten für Colletotrichum lini (West) Toch. bei künstlicher Infektion.** [Studies on the susceptibility of Flax

varieties to *C. lini* using artificial infection.]—*Acta agron. Acad. Sci. hung.*, **7**, 4, pp. 413–427, 2 graphs, 1958. [Engl., Russ. summ. 26 ref.]

The principal fungus pathogens of flax in Hungary are stated to be *C. lini* [*C. linicola*: **36**, 29], *Polyspora lini* [**35**, 451], and *Septoria linicola* [*Mycosphaerella linorum*]; *C. lini* attacks plants in their prime while the other fungi are more important at a later stage. At the Landwirtschaftliches Versuchsinstitut für die Südungarische Tiefebene, Szeged, from 1954–56, plants of 46 vars., on reaching a min. height of 10 cm., were sprayed weekly during the growing season (6 or 7 times in all) with a spore suspension prepared from a mixture of biotypes of *C. linicola*.

The mean infection rates during the 3 yr. of the tests (in a scale ranging from 0 = immune to 5 = thoroughly diseased) ranged from 2·07 to 4·94, 1 to 4·57, and 0·94 to 4·01, respectively. During the experimental period the resistance of individual vars. was steadily enhanced by means of unilateral selection. Specially recommended for breeding are K39/A and 3030 La Estanzuela for linseed, Concurrent and Margareta for fibre, and Bernburger and Sumperk Compromiss for combined linseed and fibre.

Seaman (A.). **A soft root rot of Linum usitatissimum caused by a Pseudomonas sp.** —*Plant Dis. Reptr*, **44**, 3, pp. 214–215, 1960.

This disease of flax seedlings in the laboratory, noted at Univ. Nottingham, England, was controlled by disinfection of all apparatus with tetracycline. The causal organism, which resembled *P. fluorescens*, could not be identified from its biochemical reactions.

Espeleta (V. P.) & Nuque (F. L.). **Synergism of Maranta arundinacea and Coix lachryma-jobi mosaic virus in the Abaca plants.**—*Araneta J. Agric.*, **6**, 1, pp. 45–49, 2 fig., 1959.

The above-mentioned viruses, both transmitted by *Aphis gossypii*, each produced mild mosaic symptoms, quite distinct from those of the severe form of the disease, when inoculated separately on abaca [*Musa textilis*] var. Tangongon seedlings at Inst. Agric., Araneta Univ., Rizal, Philippines. Combined infection, however, resulted in the development of severe symptoms, including stunting, pronounced chlorosis, and a fern-like appearance of the leaves. Subinoculations with sap from doubly-infected plants produced comparable effects.

In experiments by the 2nd author at the Central Exp. Sta., Los Baños, in 1956 abaca seedlings inoculated (also by means of *A. gossypii*) with mosaic virus from *Rottboellia exaltata* contracted a mild, transitory mosaic consisting of spindle-shaped dots, which also appeared in the suckers of infected plants with no obvious increase in intensity of the symptoms.

Bosmans (P.). **Schimmels op Varens.** [Fungi on Ferns.]—*Verh. Rijkssta. PlZiekt. Gent* 4, 23 pp., 2 fig., [? 1960. Fr., Engl. summ. Cyclostyled.]

The 1st part of this study comprises relevant host and fungus lists from Pape's 'Krankeiten und Schädlinge der Zierpflanzen' [**34**, 151] and Saccardo's 'Sylloge Fungorum'; the 2nd is a complete list of fungi isolated in autumn 1959 from fern nurseries near Gent, Belgium. The most prevalent spp. were a dark blue to black *Phoma* with profuse mycelial growth, a light brown *Phyllosticta*, *Verticillium* (?) *dahliae*, *Cylindrocarpon radicicola*, and *Alternaria tenuis*. Infected plants (most of which suffered no apparent ill effects) were found among 11 spp. and vars.

Elarosi (H.) & Assawah (M. W.). **Downy and powdery mildews of certain ornamental plants in Alexandria region.**—*Alexandria J. agric. Res.*, **7**, 2, pp. 253–268, 1 pl., 4 fig., 1959. [Arabic summ. 25 ref.]

At Univ. Alexandria samples from Nozha Public Gardens and the ornamental gardens and nurseries of the Fac. Agric. yielded identifications of *Peronospora*

parasitica on *Matthiola incana*, *Bremia lactucae* on *Helichrysum bracteatum*, *Oidiopsis* [*Leveillula*] *taurica* on *Tropaeolum majus* and hollyhock, *Oidium verbenae* on *Verbena hybrida*, and *Oidium* spp. on sweet pea, *Petunia*, *Zinnia elegans*, aster, and *Calendula officinalis*.

Jackson (C. R.). **Cercospora blight of Snapdragon.**—*Phytopathology*, **50**, 3, pp. 190–192, 2 fig., 1960.

At the Gulf Coast Exp. Sta., Univ. Fla, Bradenton, *C. antirrhini* [**38**, 696], which causes stunting and defoliation of antirrhinum, was shown to have an incubation period of 21–30 days; max. growth of the fungus *in vitro* occurred at 24–28° C. Mean lengths of 50 conidia (145·5±11·8 μ) and 25 conidiophores (129·2±10·3 μ) exceeded the upper limits of the ranges reported by Chupp [**33**, 635].

Woodcock (W. P.) & Dimock (A. W.). **The effect of temperature on the protective action of selected fungitoxicants against Snapdragon rust.**—Abs. in *Phytopathology*, **50**, 4, p. 242, 1960.

Jackpot antirrhinum plants sprayed with fungicides and inoculated 7 hr. later with *Puccinia antirrhini* [cf. **38**, 602] were enclosed in polythene bags and held at 45, 55, or 65° F. for 2 days; primary rust pustules were counted 13 days after inoculation. Total pustules at all temps. were: untreated, 26,145; zineb, 3; chloranil, 32; captan, 1,134; Cu, 9,200; S, 10,890. Percentage control increased with temp., particularly from 55 to 65° (captan, 94 to 98; Cu, 57 to 73; S, 49 to 72).

Nilsson (L.). **Fläcksot på Bellis.** [Spot smut on *Bellis*.]—*Växtskyddsnotiser, Stockh.*, **23**, 5, pp. 67–68, 2 fig., 1959.

The formation on cultivated daisy (*B. perennis* var. Etna) leaves in a greenhouse near Lund, Sweden, of white to greyish, round spots up to a few mm. diam. is attributed to *Entyloma bellidis*. Conidia are hyaline, often somewhat crooked or sinuous, 11–51×1·4–2·2 (mean 35×1·6) μ, while the tissue contains densely aggregated, circular, colourless to faintly yellowish spores, 8–14 (11·4) μ diam. with walls 0·6–1·9 (1·4) μ thick. The smut evidently overwinters in leaf debris in the soil, as the disease has persisted for some years on the same site.

Nelson (P. E.). **Fusarium stem rot of Carnations.**—*N.Y. St. Flow. Gr. Bull.* 171, pp. 1–3, 1 fig., 1960.

The damage to carnations caused by *Fusarium roseum* [**39**, 316] has been more readily recognized since the use of mother blocks and clean planting stock have given satisfactory control of the vascular wilt diseases. The fungus usually causes the most damage during propagation although the lesions are often too small to be detected when the cuttings are removed from the propagation bench. Mature flowering plants can be affected in several ways, one of the most frequent being the killing of stubs left when flowers are picked. The stems of mature plants may also be attacked at soil level.

Under New York conditions the Dept Plant Path., Cornell Ornamentals Res. Lab., Farmingdale, Long Island, recommends the spraying of mother blocks every 14 days during the winter and every 7–10 days during the summer, throughout the year, alternating weekly sprays of zineb at 1½–2 lb. and captan at 2 lb./100 gal. water (both plus a wetter) being given. Cutting dips are not recommended because of bacterial wilt (*Pseudomonas caryophylli*) [**35**, 825; **38**, 602]. A sterilized rooting medium must be used and resterilized after each group of cuttings is rooted.

Roland (G.). **Contribution à l'étude des viroses du Chrysanthème.** [A contribution to the study of the viroses of Chrysanthemum.]—*Meded. LandbHogesch. Gent*, **24**, 3–4, pp. 801–812, 1959. [Flem. summ. 13 ref.]

Following a brief survey of the viruses affecting chrysanthemums a report is given

of studies begun in 1954 at Sta. de Phytopathologie de l'État, Gembloux, on viroses of 80 plants of 35 vars. from 4 provinces of Belgium. Inoculations to petunia with sap from chrysanthemums affected with tomato aspermy virus [cf. **35**, 298; **38**, 748] showed flowers to be a more satisfactory source of the virus in Oct., though in spring leaves were equally so. It was evident that tomato aspermy virus is widespread in chrysanthemums in Belgium, though not, apparently, causing flower distortion. *Petunia hybrida*, *Nicotiana glutinosa*, and tobacco were more susceptible than *Datura stramonium* and *N. rustica*. The reaction of *N. glutinosa* is the most specific, but petunia is preferable as being very receptive and easier to grow. In inoculated cut leaves of *Chenopodium amaranticolor* symptoms appeared after 4 days. In 3 cases only, petunias inoculated with sap from diseased chrysanthemums developed yellow spots, indicating the presence of chrysanthemum virus b [cf. **37**, 238], which was transmitted from petunia by *Aulacorthum solani*. An unidentified virus found in 26 chrysanthemum plants caused a yellow mosaic of sunflower leaves and sometimes vein clearing, but the condition was not transferable to the test hosts or back to sunflower.
[A note on this work also appears in *Rev. Agric., Brux.*, **13**, 2, pp. 227–228, 1960.]

Khristova (Eleonora). Болести и неприятели по Хризантемите и средства за борба с тях. [Diseases and enemies of Chrysanthemum and means of their control.]—Овощарство [*Ovoshtarstvo*], **7**, 2, pp. 34–37, 3 fig., 1960.

This survey from Inst. Plant Protection, Sofia, includes a section on leaf spot (*Septoria chrysanthemella*) [cf. **38**, 410], *Verticillium* wilt (*V. alboatrum*) [**38**, 147], mildew (*Oidium chrysanthemi*), grey mould (*Botrytis cinerea*), rust (*Puccinia chrysanthemi*), and [unspecified] virus degeneration.

Ray blight outbreak hits Pennsylvania severely.—*Flor. Exch.*, **133**, 10, p. 8, 1959. [*Biol. Abstr.*, **35**, 2, p. 499, 1960.]

A report on a destructive attack of *Ascochyta* [*chrysanthemi*: **37**, 702] on greenhouse and outdoor chrysanthemums in Pa, N.J., and Md. Symptoms and control are reviewed.

Stalder (L.) & Schultz (F.). **Versuche zur Bekämpfung der Wurzelbräune bei Cyclamen.** [Experiments on the control of root browning of Cyclamen.]—Reprinted from *Schweiz. Gartenb. Bl., 1960*, 1, pp. 7–10, 2 fig., 1960.

The chemical control of root infection of cyclamen by *Thielaviopsis basicola* [cf. **34**, 301] has not yet been finally solved, but provisional directions are given for treatment by watering with 0·5% captan at 4 stages of growth. A considerable improvement may also be effected by stem sterilization of the soil, and a combination of this method with subsequent admixture of a fungicide is thought to be the most hopeful line of approach.

Goltz (H.). **Ein Oidium auf Freesia.** [An *Oidium* on Freesia.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., **13**, 11, p. 216, 1959.

In late Dec. 1958 leaves of a few freesia plants in a nursery at Potsdam-Grube developed scattered, round, powdery mildew patches (av. 5 mm. diam.), at first white, turning to ochre. The colourless, thin-walled, vacuolated conidia (av. 32·2 $\times$15·4 μ) were cylindrical-barrel shaped, usually 6–8 in a chain. No perithecia were found. Attempts to inoculate other freesia plants by spraying with spore suspension were unsuccessful. This appears to be the 1st record of *Oidium* on freesia.

Gigante (R.). **Una forma di mosaico del Gladiolo causata dal virus del mosaico del Cetriolo.** [A form of Gladiolus mosaic caused by Cucumber mosaic virus.]—

Boll. Staz. Pat. veg., Roma, Ser. 3, **17** (*1959*), 1, pp. 45–60, 8 fig., 1960. [Engl. summ. 22 ref.]

Gladioli, especially of the Hochsommer, Gratia, Aristocrat, and Spic and Span vars., in a glasshouse near Rome, developed a yellowish mottling and streaking of the leaves, were stunted, and bore few flowers, which were small and frequently aborted; the flower axes were twisted and sinuous. Mottling of the flowers was not observed [cf. Klinkowski, **35**, 813]. Standard host reactions and the physical properties of the virus indicated it to be cucumber mosaic virus [cf. **37**, 665; **38**, 749].

Sharma (B. B.). **On the root rot of Kochia indica Wight.**—*Proc. Indian Acad. Sci.*, Sect. B, **51**, 3, pp. 150–156, 1 pl. (5 fig.), 7 fig., 1960.

A description is given, from Bot. Dept, Univ. Lucknow, of a root rot, caused by *Rhizoctonia* [*Corticium*] *solani*, which commonly affects *K. indica* in gardens in the Lucknow area. In the seedling stage the disease occurs as a damping-off. The earliest symptom in young plants is the etiolation of the stem base, which gradually turns brown and at ground level black; scattered white spots appear in the etiolated parts, and at a later stage the foliage dries up. In older plants the withering of the foliage starts from below; the main axis of the plants turns reddish brown, hardens, and remains erect. The stem base develops several irregular longitudinal folds. The upper parts of the roots also rot. In the final stage, when the plants have dried out, numerous small black sclerotia appear over the main axis and certain of the roots. Histopathological findings are described in detail. A *Fusarium* sp., associated with the diseased plants, is a secondary invader.

Gäumann (E.) & Hohl (H. R.). **Weitere Untersuchungen über die chemischen Abwehrreaktionen der Orchideen.** [Further studies on the chemical defensive reactions in Orchids.]—*Phytopath. Z.*, **38**, 1, pp. 93–104, 4 graphs, 1960. [Engl. summ.]

In further work at the Eidg. Techn. Hochschule, Zürich [**39**, 175], it was determined that the bulb tissues of *Orchis militaris* begin to produce the antibody orchinol about 36 hr. after infection with *Rhizoctonia repens*. The entire metabolism of all the tissues is then turned to warding off the infective agent, reaching a max. after about 8 days. The conc. of orchinol in the cell liquid near the focus is then about 10^{-3}–10^{-2} M. Round this there is an immunization barrier about 6 mm. thick with a particularly high orchinol content which shuts off the local focus. From this barrier to the distal tissues immunity decreases rapidly so that in these tissues the orchinol content is not always sufficient to protect them from new infections.

Sutton (D. D.), Ark (P. A.), & Starr (M. P.). **The causal agent of bacterial brown rot of Cypripedium Orchids.**—*Phytopathology*, **50**, 3, pp. 182–186, 1960.

A detailed description from Univ. Calif., Berkeley, of *Erwinia cypripedii* [**30**, 372], with some discussion of its taxonomy. It is non-pectolytic.

Holmes (F. O.). **Cure of Rose mosaic by heat.**—Abs. in *Phytopathology*, **50**, 4, p. 240, 1960.

Rooted cuttings of Grüss an Teplitz rose affected by rose mosaic virus were held in 4 in. pots, under 16 hr. light daily, at 32·5–36° C. Enclosure of the pots in plastic bags (with bottom drainage) ensured maintenance of soil temp. at $\frac{1}{2}$–$1\frac{1}{2}$° below air temp. Plants treated for 4–10 weeks have subsequently developed only healthy-appearing foliage for $>$ 9 months; shorter exposure was ineffective.

Caporali (L.). **Sur la formation des suçoirs de Sphaerotheca pannosa (Wall.) Lév. var. rosae dans les cellules épidermiques des folioles de Rosa pouzini Tratt.** [On the formation of haustoria of *S. pannosa* var. *rosae* in the epidermal cells of the

leaflets of *R. pouzini*.] **Étude cytologique du parasitisme de Sphaerotheca pannosa (Wallr.) Lév. var. rosae sur les folioles de Rosa pouzini Tratt.** [Cytological study of the parasitism of *S. pannosa* var. *rosae* on the leaflets of *R. pouzinii*.] —*C. R. Acad. Sci., Paris*, **250**, 13, pp. 2415–2417, 9 fig.; 16, pp. 2822–2824, 7 fig., 1960.

Penetration by *S. pannosa* was observed to be effected by means of lysis of the cuticle and subjacent pectocellulosic strata. The delicate wall of the haustorium [cf. 17, 579] soon becomes enveloped in a 2nd, dense layer, probably very rich in pectic substances, which stains vividly with ruthenium red.

The cytological structure of *S. pannosa* is described in the 2nd paper. In the epidermal cells of the host the plastids regress and lose their starch content. The latter is also greatly reduced in the cells of the subjacent mesophyll.

Fisher (R. W.), Chamberlain (G. C.), & Kemp (W. G.). **Control of powdery mildew of greenhouse Roses with polybutenes.**—*Plant Dis. Reptr*, **44**, 4, pp. 273–275, 1 fig., 2 diag., 1960.

In further tests [cf. **39**, 208] by Canada Dept Agric., Ont., *Sphaerotheca pannosa* [cf. **39**, 417] on Pink Garnet Supreme, a highly susceptible rose var., was effectively controlled with 4, 1–3% indopol polybutene (H-35) emulsion sprays at 7–10 day intervals. Karathane at ½ lb. 100 gal. followed by 1% H-35, was superior to karathane alone, was non-phytotoxic, and gave the leaves a sheen and depth of colour.

Prota (U.). **Alternaria zinniae Pape parassita delle Zinnie in Italia.** [*A. zinniae*, a parasite of Zinnias in Italy.]—*Riv. Ortoflorofruttic.*, **43**, 3–4, pp. 164–168, 4 fig., 1959. [Engl. summ., 20 ref.]

An account is given of studies at the Istituto di Patologia Vegetale, Univ. Sassari, Sardinia, on leaf and stem blight of zinnias (*A. zinniae*) [cf. **30**, 521; **33**, 297; **38**, 9]. The disease, not recorded in Italy, was found in Sardinia in Oct. 1958.

Assawah (M. W.) & Elarosi (H.). **An Alternaria leaf spot of Zinnia.**—*Alexandria J. agric. Res.*, **7**, 2, pp. 93–101, 1 pl., 2 fig., 1959. [Arabic summ.]

The causal agent of this disease on *Z. elegans* in the Alexandria region was identified at Univ. Alexandria as *A. zinniae* [cf. above], apparently a new record for Egypt. The fungus was shown to be seed-borne.

Korshunova (Mme A. F.). Меры против ложномучнистой росы Подсолнечника. [Measures against false mildew of Sunflower.] —Защ. Раст., Москва [*Zashch. Rast., Moskva*], **5**, 2, pp. 20–21, 1960.

Plasmopara halstedii, recorded on sunflower in 1949 in the Moldavian S.S.R. and in the foot hills of the Krasnodar area [cf. **39**, 320; map 286], now occurs over almost all the N. Caucasus, and there are foci in some regions of the Ukrainian S.S.R. Steeping the seed in granosan or mercurane (2 kg./ton) is recommended. The disease was present in fields where sunflower was sown again after 1–4 yr. but there was no infection with an interval of 7–8 yr.

Smith (J. D.). **Turf diseases in the north of Scotland.**—*J. Sports Turf Res. Inst.*, **10** (*1959*), 35, pp. 42–46, 1960.

The severity of *Fusarium* patch disease (*Calonectria graminicola*) [*C. nivalis*: **38**, 604] noted in the area (57–60° N.) throughout 1957–60 was related to the condition of the turf at the time of the heavy frosts in late autumn and winter. *Ophiobolus graminis* var. *avenae* is very common on *Agrostis* [loc. cit.] turf and occasionally affects *Poa annua*. It is probably seed-borne and may be of importance in agricultural grassland. Only 1 severe case (in 1955) of dollar spot (*Sclerotinia homoeocarpa*) on sea-marsh turf [**34**, 526] was noted, but traces were found on turfs

containing the susceptible Sea-Marsh fescue (*Festuca rubra* ssp. *rubra*). Several severe cases of powdery mildew (*Erysiphe graminis*) were detected on Chewing's fescue lawns. Anthracnose (*Colletotrichum* (?) *graminicola*) is very common in the area on weak *P. annua*. One severe case of leaf blight (*Helminthosporium siccans*) on rye grass was noted in Caithness in 1958 and 1959 following a heavy dressing of N.

Jackson (N.). **Turf disease notes, 1959.**—*J. Sports Turf Res. Inst.*, **10** (*1959*), 35, pp. 47–53, 1960.

Except at the lowest rate, cadmium fungicide [cf. **37**, 591] effectively prevented the reappearance of *Fusarium* patch disease [*Calonectria nivalis*] on turf where severe outbreaks followed persistent rain in 1959; at 2 or 4 g./250 ml. water 25 sq. ft., fungicide 12 was very effective but allowed some infection at 1 g. *Corticium* [*fuciforme*: *loc. cit.*] infected 11 rye grass vars., sown in duplicated 20 sq. yd. plots, to varying extent: 2 meadow fescue [*Festuca pratensis*] vars. included in the trial were also attacked. Dollar spot [*Sclerotinia homoeocarpa*] on Sea Marsh [*F. rubra* ssp. *rubra*], restricted during the dry months, became very heavy after the autumn rains. A number of cases of infection of *Poa annua* by *Colletotrichum graminicola* were reported: *Helminthosporium siccans* heavily infected a sparsely grazed area of *Lolium perenne* heavily treated with poultry manure. *H.* sp. was frequently isolated from dying New Zealand crested dog-tail [*Cynosurus cristatus*] with foot rot and leaf spot symptoms. At the rates used none of the 6 fungicides tested from 1957–59 against *H. vagans* on *Poa pratensis* turf was satisfactory, but a general fertilizer prevented turf deterioration and reduced the disease in 1957 and 1958, but not in 1959.

Röed (H.). **Sclerotinia borealis Bub. & Vleug., a cause of winter injuries to winter cereals and grasses in Norway.**—*Acta agric. Scand.*, **10**, 1, pp. 74–82, 4 fig., 1960.

The author (Norwegian Plant Protection Inst. Vollebekk), after noting that *S. borealis* [**30**, 364; **37**, 50] injured winter wheat (sometimes very severely) in the spring of 1956 in a few places in Hedmark, presents a brief account of the fungus, symptoms, cause, and occurrence in Norway. The fungus has been identified on *Agrostis tenuis*, *Alopecurus pratensis*, *Bromus inermis*, *Dactylis glomerata*, *Poa pratensis*, *Phleum pratense*, rye, summer wheat, and an unidentified grass. Apart from *P. pratense*, which was usually destroyed, the attacks on grasses were mostly few and sparse even in badly affected areas, though *D. glomerata* appears to be one of the more susceptible. At lower altitudes there has often been more or less severe thinning of the leys, while in more elevated areas total destruction has occurred, especially in places where the snow cover remained until late spring.

More severe attacks on winter wheat were observed in 1956 in Hedmark only. At Freberg in Furnes injury was so severe in one field of 50 decares under Sigyn II that it had to be harrowed, though in an adjacent field of the same var. the damage permitted a fair crop in a good season. At Möystad and at Hol in Furnes the fungus was present to a small extent only on winter rye. In 1958 there was some damage in wheat sowing-time trials and var. tests at Möystad.

Mühle (E.). **Zur Frage des Resistenzverhaltens der Gräser gegenüber bakteriellen und pilzlichen Krankheitserregern.** [On the question of the resistance reaction of grasses towards bacterial and fungal pathogens.]—*Biol. Zbl.*, **78**, 4, pp. 622–630, 4 graphs, 1959.

The sources of *Puccinia coronata* [**32**, 193] used in these studies at the Institut für Phytopathologie der Karl-Marx-Universität, Leipzig, Germany, were *Arrhenatherum elatius*, *Lolium multiflorum*, and *Festuca pratensis*. Of the 112 fodder grass spp. inoculated at the 3-leaf stage and tested for resistance after 8–16 days (3 days at high R.H. and 16–22° C. and thereafter under normal greenhouse conditions),

55 proved to be immune from all 3 strs. of the rust, including *Agrostis alba*, *Bromus inermis* and many other *B.* spp., *Festuca rubra*, *F. heterophylla*, and numerous *Poa* spp., including *P. pratensis*. On the other hand, only *Alopecurus myosuroides*, *Anthoxanthum aristatum*, *Lamarckia aurea*, *Phalaris paradoxa*, and *Phleum paniculatum* were susceptible to all the strs.

The str. with the narrowest host range was that from *Arrhenatherum elatius*, which caused less than 50% infection on only 3 spp., including *Trisetum flavescens* and *Phalaris canariensis*, and more than 50% on *L. aurea* and *Anthoxanthum aristatum*, besides its own host.

The str. from *Lolium multiflorum* caused less than 50% infection on *Alopecurus pratensis*, *F. pratensis*, *F. ovina*, *P. arundinacea*, and *T. flavescens*, and more than 50% on *Dactylis glomerata*, *F. gigantea*, *F. arundinacea*, *Phleum pratense*, *L. perenne* (which was sometimes more heavily infected than *L. multiflorum* [**38**, 736]), *L.* sp., and *Lamarckia aurea*.

Less than 50% infection was caused by the str. from *F. pratensis* on *Arrhenatherum elatius*, *D. glomerata*, *F. gigantea*, *Lolium* sp., *Phalaris arundinacea*, and *Phleum pratense*, and more than 50% on its own host and *Lamarckia aurea*.

In the localities inspected by the author *Erysiphe graminis* [**30**, 274] was most prevalent on *Poa pratensis*, *T. flavescens*, *D. glomerata*, *F.* spp., *Lolium perenne*, and *B. secalinus*, which has sustained particularly heavy damage since its inclusion in plant-breeding operations. Inoculations were performed with 8 strs. on 47 fodder grass spp. with the following results. The strs. from *D. glomerata* and *T. flavescens* were strictly specialized on their own hosts and evidently represent 2 physiologic races. The host range of the 2 from *F. pratensis* and *L. perenne* was so closely similar that they may be regarded as practically identical. Both attacked their own hosts and *L. multiflorum*, the latter much less severely. The host ranges of the 2 strs. from *P. pratensis* were the widest and also largely identical, both being pathogenic to *A. elatius*, *Alopecurus pratensis*, and *Phleum pratense*. There was, however, a clear difference in aggressiveness, 1 causing very heavy infection on *Poa palustris* which the other did not attack, and 2 distinct races are therefore presumed to be involved. Of 27 *F.* spp. tested for resistance to a str. of *E. graminis* from *F. rubra*, *F. amethystina*, *F. ampla*, *F. capillata*, and *F. gigantea* were immune, while *F. pratensis* was only slightly infected. *F. heterophylla* and *F. ovina* were more susceptible.

Of 30 *B.* spp. inoculated with *Pleospora* [*? Pyrenophora*] *bromi*, 17 were not or only mildly infected, including *B. villosus*, *B. japonicus*, *B. mollis*, *B. secalinus*, *B. sterilis*, and *B. tectorum*. A group of 10 sustaining slight to moderate damage with conidial formation included *B. curvensis* and *B. commutatus*, while *B. inermis*, its var. *aristatus*, and *B. erectus* were heavily parasitized with abundant perithecial production. In field experiments, 64 selections of *B. inermis* and the 2 vars. Ostland and v. Kamekes also proved uniformly susceptible.

Ohmann-Kreutzberg (G.), Pawlitscher (W.), & Schmidt (H. B.). **Eigenschaften des Weidelgrasmosaik-Virus.** [Characteristics of the Rye grass mosaic virus.] —*Phytopath. Z.*, **38**, 1, pp. 13–17, 4 fig., 1 graph, 1960. [Engl. summ.]

From Inst. für Phytopathologie, Aschersleben, Germany, a report is given on a spherical virus (diam. 25–28 mμ) of rye grass (*Lolium multiflorum*) [cf. **37**, 98] not previously described. The guttation fluid of young infected plants proved infectious. A molecular weight of $M = 3{\cdot}6 \times 10^6$ was determined for the virus by sedimentation and diffusion measurements.

Tamini (S. A.) & Dunn (G. M.). **Artificial inoculation of smooth Bromegrass with Pyrenophora bromi.**—*Agron. J.*, **52**, 4, p. 238, 1960.

During the winters of 1956–7 and 1957–8 greenhouse inoculations of *Bromus*

inermis seedlings and clones with *P. bromi* [cf. **36**, 33; **38**, 9] were made at Univ. New Hamp., Durham. In cultures obtained by plating leaf lesions on agar after sterilization with 0·001% $HgCl_2$ conidial production was very poor. The inocula used included mycelial-conidial suspensions of agar cultures, ground infected leaves, and ascospores produced on grain. Satisfactory infection was obtained in only 4 of 16 inoculations with mycelial-conidial suspensions. Ascospores from grain were much more effective. When pulverized, infected brome grass leaves were applied by hand to moist plants in the incubation chamber, satisfactory infection occurred in 7 of 8 inoculations. Infected leaves were easily obtained and prepared and required an incubation period of only 3 days. They were more effective on clones than on seedlings, which often decayed rapidly after inoculation. Leaf inoculum was difficult to apply uniformly and frequently produced symptoms of other leaf diseases.

Walker (J.). **Ergot of Phalaris tuberosa.**—*Agric. Gaz. N.S.W.*, **70**, 12, pp. 642–643, 3 fig., 1959.

It is reported from Dept Agric. that 2 ergot fungi attack *P. tuberosa* in N.S.W.: *Claviceps purpurea*, which occurs on *P.* throughout the State, and *C. phalaridis* [**37**, 672], found only in seed harvested in southern districts where it is an increasingly important contaminant. Seed grown in Victoria and S. Australia also contained ergots of *C. phalaridis*.

Diachun (S.) & Henson (L.). **Clones of Red Clover resistant to four isolates of Bean yellow mosaic virus.**—*Phytopathology*, **50**, 4, pp. 323–324, 1960.

In this further study at Univ. Ky, Lexington [cf. **39**, 177], the reactions of 55 selected clones from rooted cuttings of Kenland red clover to 4 isolates of bean yellow mosaic virus are tabulated according to the appearance of systemic mottle or vein yellowing in varying degree, local necrotic spotting or systemic necrosis or both, a combination of these two types of symptom, and absence of symptoms. The data are discussed. Ten clones were resistant to all 4 isolates; some of the necrotic-spotting clones may be useful as breeding stock.

Manglitz (G. R.) & Kreitlow (K. W.). **Vectors of Alfalfa and Bean yellow mosaic viruses in Ladino White Clover.**—*J. econ. Ent.*, **53**, 1, pp. 113–115, 1960.

At U.S. Dept Agric., Beltsville, Md, clover, yellow clover, and pea aphids (*Anuraphis bakeri*, *Therioaphis trifolii*, and *Macrosiphum pisi* [*Acyrthosiphon pisum*], respectively) transmitted lucerne mosaic from infected to virus-free Ladino white clover plants, while bean yellow mosaic virus [**39**, 420] was transmitted by the 1st- and last-named only [cf. **37**, 732]. Fed on plants infected by both viruses the clover and pea aphids transmitted each separately and indiscriminately. Tests of transmission by 2 other aphid and 2 leaf-hopper spp., a mite, and a slug failed.

Korobeĭnikova (Mme A. V.). Сохранение и накопление в почве видов **Fusarium,** поражающих Клевера. [The preservation and accumulation in the soil of species of *Fusarium* infecting Clover.]—Бюлл. н.-т. Информ. Уральск. н.-и. Инст. сел. Хоз. [*Byull. n-t. Inform. Ural'sk. n.-i. Inst. sel. Khoz.*], *1958*, 4, pp. 27–29, 1958. [Abs. in *Referat. Zh. Biol.*, *1960*, 5, p. 191, 1960.]

At Urals sci. res. Inst. for Agric. laboratory and field experiments [cf. **35**, 460] showed *F. avenaceum* to perish in soil without the host plant, whereas *F. oxysporum* and *F. solani* retain their viability for 11 months owing to their ability to form chlamydospores. *F. solani* was pathogenic to winter rye, spring wheat, barley, oats, and timothy grass [*Phleum pratense*] sown in inoculated soil. Only *P. pratense* was not infected by *F. avenaceum*. Cereal crops as a cover for clover seem to cause an accumulation of *Fusarium* infection.

Viennot-Bourgin (G.) & Courtillot (M.). **Une nouvelle espèce de rouille de la Luzerne.** [A new rust sp. on Lucerne.]—*C. R. Acad. Agric. Fr.*, **46**, 4, pp. 182–185, 1960.

Inspections in 1959 of crops of Flemish lucerne at Palaiseau, Seine-et-Oise, and at Naucelle, Aveyron, revealed infection by *Uromyces magnusii* [cf. Guyot, **36**, 789], widespread in France on *Medicago maculata* and *M. minima* but not hitherto recorded on cultivated lucerne. The leaves of infected lucerne rapidly withered and fell after flowering, previously becoming so fragile that shaking dislodged them all. Parasitization of lucerne is considered to be a new adaptation of this fungus, which is currently under study at the I.N.R.A. Pathologie végétale.

Roberti (C.). **Cephalosporium associated with Alfalfa root rot.**—Abs. in *Phytopathology*, **50**, 4, p. 241, 1960.

Observations in R.I. have shown *C.* to be present in over 90% of young root lesions in lucerne affected by crown root rot [cf. **38**, 753], a major disease in the area. Small black specks or hair-like lesions start in the root epidermis and develop into sunken areas in the cortex; root hairs are killed and the primary root may die back. Reddish-brown to brown streaks in the xylem and pith may extend to the crown of young plants.

Ribaldi (M.). **Ricerche sul diradamento dei Medicai italiani. 2°. Alcune osservazioni e ricerche sul Corynebacterium insidiosum (McCull.) Jensen agente di un avvizzimento fogliare e di un marciume radicale dell' Erba medica (Medicago sativa L.) in Emilia. 3°. Su un caso di avvizzimento dell' Erba medica (Medicago sativa L.) per infezione radicale da Sclerotium bataticola Taub.** [Researches on the thinning of Italian Lucerne plantings. 2. Observations and researches on *C. insidiosum*, the cause of a leaf wilt and root rot of Lucerne (*M. sativa*) in Emilia. 3. On a case of wilt of Lucerne through root infection by *Macrophomina phaseoli*.]—*Agricoltura ital.*, A. **59** (N.S. **14**), 6, pp. 187–215, 9 fig.; 7, pp. 237–251, 5 fig., 1959. [Engl. summ. 21 & 17 ref.]

In the 1st paper, studies at Univ. Perugia on bacterial wilt of lucerne plants 2–3 yr. old growing in irrigated fields in Bologna, caused by *C. insidiosum* [**37**, 732] are described. In the 2nd, *M. phaseoli* [cf. **37**, 371] is reported to have been found on lucerne [cf. **37**, 133] for the 1st time in Italy in July, 1956, in the experimental fields of Univ. Perugia, confined to small, scattered areas. Infection of lucerne and bean (*Phaseolus vulgaris*) was obtained with 2 strs. of the fungus, the cultural and morphological characters of which are described. The work of Reichert & Hellinger on the sub-sp. of the fungus [**28**, 85] is critically discussed.

Ribaldi (M.). **Ricerche preliminari su di un 'marciume carbonioso' di natura fungina delle radici dell' Erba medica (Medicago sativa L.).** [Preliminary researches on a 'charcoal rot' of fungal nature affecting Lucerne roots.]—Reprinted from *Agricoltura ital.*, A. **59** (N.S. **14**), 7, 4 pp., 1 fig., 1959. [Engl. summ. 15 ref.]

Studies at Univ. Perugia on this disease on lucerne plants growing in experimental fields are described. The causal organism, which has conidia 9–18×5–8 μ and somewhat resembles *Diplodia natalensis*, is provisionally named *Botryodiplodia medicaginis*.

Ribaldi (M.). **Osservazioni preliminari su di un marciume di natura fungina della corona e del fittone dell' Erba medica (Medicago sativa L.) in Umbria.** [Preliminary observations on a fungal rot of the crown and taproot of Lucerne in Umbria.]—Reprinted from *Agricoltura ital.*, A. **59** (N.S. **14**), 7, 5 pp., 1959. [Engl. summ. 18 ref.]

Studies at Univ. Perugia are described on a crown and root rot of 1–3 yr. old lucerne

plants in non-irrigated fields in different parts of Umbria, caused by *Fusarium roseum*, alone or in combination with *F. caeruleum*. Widespread death of affected plants occurred. Wound inoculations of roots of 5–6 months old lucerne seedlings with *F. roseum* reproduced the symptoms; inoculations with *F. caeruleum* are in progress.

Ribaldi (M.). **Aspetti e problemi attuali del deperimento dei Medicai italiani. (Primi risultati di un quadrennio di ricerche).** [Present aspects and problems of the dying-off of Italian Lucerne plantings. (First results of four years' researches.)]—Reprinted from *Ann. Fac. Agr., Perugia*, **14**, 12 pp. 3 fig., 1959.

The author reviews investigations during 1955–59 into the dying-off of lucerne in Italy, most of which have been noticed [**37**, 548 and above]. In Ancona and Catania *Verticillium alboatrum* was invariably present.

Isaac (I.). **Verticillium wilt of Lucerne.**—*N.A.A.S. quart. Rev.* 46, pp. 75–79, 5 fig., 1959.

A summarized account of information already noticed [**39**, 420].

Elling (L. J.) & Frosheiser (F. I.). **Reaction of twenty-two Alfalfa varieties to bacterial wilt.**—*Agron. J.*, **52**, 4, pp. 241–242, 1960.

In uniform varietal tests at Univ. Minn. and the Crops Res. Div., U.S.D.A., in which 22 lucerne vars. were inoculated with *Corynebacterium insidiosum* [cf. **39**, 114] by dipping the roots in inoculum, resistance expressed as a percentage of that of Vernal, with 46·2% resistant plants (i.e. scoring 0 or 1 points on a scale 0 = no symptoms, to 5 = plants very severely diseased or dead) was for Teton, 72%; A-600, 69%, Buffalo, 67%; Lahontan, 40%; Rambler, 36%; and Ranger 35%.

Ford (R. E.). **A report on the testing of Lotus species for resistance to Stemphylium leafspot and stem canker.**—*Plant Dis. Reptr*, **44**, 4, pp. 276–280, 1960. [14 ref.]

Greenhouse inoculations with *S. loti* [**37**, 496] at Cornell Univ., Ithaca, N.Y., showed notable differences in individual responses with most spp., and strs. resistance being most common among vars. and strs. of *L. corniculatus*. Resistance tests on detached leaves were reliable enough to substitute for whole-plant tests, but field inoculation failed to induce a satisfactory epiphytotic.

Luckwill (L. C.) & Campbell (A. I.). **Malus platycarpa as an Apple virus indicator.**—*J. hort. Sci.*, **34**, 4, pp. 248–252, 1 pl., 1959.

A clone of *M. platycarpa* has proved useful in studies of apple viruses at Long Ashton Res. Sta., Bristol, and budwood is available on request. Bud inoculation gives rise to line pattern and dwarfing symptoms, the [unspecified] viruses in question being widely distributed in latent form in commercial apple vars., and in the Malling series of clonal rootstocks. A pronounced scaly bark symptom sometimes encountered seemed to be of fungal origin, but the agent has not yet been identified.

Schmid (G.). **Viröse Berostung und Rißbildung an Äpfeln.** [Virus russeting and cracking on Apples.]—*Schweiz. Z. Obst- u. Weinb.*, **69**, 3, pp. 54–60, 5 fig., 1960.

Further grafting experiments at the Eidg. Versuchsanstalt, Wädenswil, Switzerland [**35**, 194], led to the conclusion that the russeting and cracking on apples are due to 2 viruses or possibly 2 strs. of 1 virus, of which one apparently produces russeting on Boskoop and Berlepsch without star crack [**38**, 526] and is mutually transmissible, while the other causes star crack and russeting on Glockenapfel, Champagner Reinette, and Ontario and is transmissible from one to another of those but not to Boskoop and Berlepsch. It is possible that 2 strs. of the same virus may occur in

1 var., as the symptoms of russeting and cracking occurred both singly and together on Boskoop. These studies are being continued.

Millikan (D. F.) & Guengerich (H. W.). **Further observations on the scar skin disease of Apple.** *Plant Dis. Reptr.*, **44**, 4, pp. 260–261, 3 fig., 1960.

At Mo. agric. Exp. Sta., Columbia, healthy scions of several vars. grafted on to diseased trees produced fruit with scar skin [**36**, 411]. The susceptible var. Virginia Crab is a useful indicator of the disease [cf. **36**, 328].

Bilous (I. I.) & Naumenko (I. M.). Пошкодження паршею сортів Яблуні та їх стійкість до неї в умовах лісостепу України. [Scab infection of Apple varieties and their resistance in the conditions of the forest-steppe of the Ukraine.]—Допов. Укр. Акад. сіл.-гос. Науk [*Dopov. Ukr. Akad. sil.-hos. Nauk*], **3**, 1, pp. 31–32, 1960. [Russ. summ.]

In 1956 apple scab [*Venturia inaequalis*: cf. **39**, 234] infection was 6·4% at the Bilkŷ State farm, Vinnitskaya region, and 11·1% at the Chervonŷĭ Partizan State farm, Khmel'nitskaya region. Analyses at the Ukrainian sci. res. Inst. for Orchard Culture showed that infection is higher in the W. than in the E. forest-steppe, meteorological conditions in the former being more favourable for spread: leaf infection is heavier than fruit. This held true for the autumn vars. Antonivka zvŷchaĭna and Pepin shafran which were the most resistant. Among the winter vars. Parmen zŷmovŷĭ zolotŷĭ. Tŷrol'ka zvŷchaĭna, Jonathan, and Reinette kurs'kŷĭ zolotŷĭ were only mildly susceptible [cf. **39**, 28].

Burchill (R. T.). **The role of secondary infections in the spread of Apple mildew (Podosphaera leucotricha (Ell. and Ev.) Salm.)** *J. hort. Sci.*, **35**, 1, pp. 66–72, 1960.

In further observations at Long Ashton Res. Sta., Bristol [cf. **38**, 89], the effects of wind and light on secondary infection were difficult to assess, but field records indicated heaviest infection on that side of the tree sheltered from the prevailing wind and from direct sunlight. It seemed that the carry-over of the fungus is predominantly dependent on the establishment of secondary infections on the leaves, particularly the terminals, and subsequent spread of the disease *via* the petiole to the bud [cf. **39**, 116]. Tipping all leader growths eradicated much of the overwintering fungus, markedly reducing the inoculum potential in the following spring.

In dry weather new infections may occur throughout the season, but wet conditions appear to restrict them. The major effectiveness of fungicidal sprays is in checking these infections [cf. **35**, 778; **38**, 607] and thus the bud infections which follow from them, but a spraying schedule extending well into the summer is unlikely to be economic. In areas of high mildew intensity the removal of a fair proportion of the terminal buds might be justified, and possibly spur pruning as well. Elsewhere the most practicable solution would appear to be a suitable programme of post-blossom sprays, combined with the cutting out of all visibly mildewed shoots in winter, and of diseased blossom trusses and extension shoots in the spring.

Tanaka (Y.). **A study on powdery mildew of Apple. Part I. Concerning the attack of young growth.**—Abs. in *Ann. phytopath. Soc. Japan*, **24**, 1, pp. 17–18, 1959. [Jap.]

In trials at Aomori with 'kōgyoku' apple trees infection by powdery mildew [*Podosphaera leucotricha*] was recorded at each leaf stage. The disease is visible to the naked eye from June onwards. The percentage of attack is low in leaves before the 10th stage, while before the 5th stage they are free from infection. The highest degree of attack is from the 10th to about the 20th leaf stage (late May to

early July), after which the incidence is again low. Healthy new growth declines rapidly from late June and is entirely absent in middle and late July.

Keil (H. L.) & Wilson (R. A.). **Evaluation of fungicides for control of powdery mildew, as well as other diseases, of Apple.**—*Plant Dis. Reptr*, **44**, 4, pp. 253–255, 1960.

At U.S. Dept Agric., Beltsville, Md, sprays with micronized wettable S [**36**, 597; cf. **38**, 607] at 1–2 lb., 25% karathane WD [cf. **37**, 486] at 0·5 lb., 48% karathane liquid concentrate at 0·25 pint, and 65% dodine (cyprex) [cf. **39**, 475] at 1·5 lb., all/100 gal., gave equally good control of *Podosphaera leucotricha*. Dodine was notably less effective at lower concs., but it proved superior to other fungicides in control of scab (*Venturia inaequalis*), sooty blotch (*Gloeodes pomigena*), and fly speck (*Leptothyrium pomi*).

Trifonov (D.). Брашнестата мана по Ябълката и борбата с нея. [Powdery mildew of Apple and its control.]—Овощарство [*Ovoshtarstvo*], **7**, 4, pp. 26–30, 6 fig., 1960.

At the Inst. of Fruit-Growing, Kostinbrod, Bulgaria, some effect on *Podosphaera leucotricha* [cf. **8**, 258] was obtained from 1% karathane, 1% Ba, and finely ground S at 0·4% during flowering and at 0·3% thereafter.

Moore (M. H.) & Bennett (Margery). **Experiments on the control of Apple canker by spraying.**—*Rep. E. Malling Res. Sta., 1959*, pp. 85–91, 4 fig., 1960. [16 ref.]

Experimental spraying from 1956–59 of susceptible M.VIII apple rootstock indicated that the incidence of canker (*Nectria galligena*) [**39**, 422] could be greatly reduced by 2 Cu sprays applied in autumn, the 1st before the main leaf fall and the 2nd at about 50% leaf fall. At least 1 further application is advisable in spring at bud swell, especially in localities having high spring rainfall. Where there is a severe epidemic the spray programme must be supplemented by thorough excision of the old cankers, preferably between the autumn and spring applications.

Terui (M.). **Diseases of Apples in storage.**—*Bull. Fac. Agric. Hirosaki Univ.* 5, pp. 58–62, 1 fig., 1959. [Japs. Abs. from Engl. summ.]

Fifteen diseases affecting apples stored at 0–3° C. in Nov.–Mar. and at 6–18° in Apr.–June included those caused by *Penicillium expansum*, *Cephalothecium roseum*, *Nectria galligena*, *Sclerotinia fructigena* [cf. **16**, 325], *Phomopsis* sp., *Gloeosporium* sp. [cf. **17**, 757], *Physalospora obtusa* [cf. **16**, 62], *Botrytis cinerea*, and *Glomerella cingulata* and the physiological disorders, bitter pit, Jonathan freckle (a type of scald), Jonathan spot, internal breakdown, and soft and common scald. *Phomopsis* sp. caused a new type of rot which 1st appeared as a small light brown watery area round the stem that extended rapidly to the entire fruit. Blackish brown pycnidia are produced under the epidermis. The fungus is to be described. [In a further account of this disease, named stalk rot (abs. in Jap. in *J. phytopath. Soc. Japan*, **24**, 1, p. 17, 1959) the ovate, thin walled pycnidia are described as $230 \times 450\,\mu$ and the 2 types of pycnidiospores as $4{\cdot}9 \times 2{\cdot}7$ and $14–33 \times 1{\cdot}5–2\,\mu$.]

Conway (T.). **Reducing incidence of bitter pit in Apples.**—*N.Z.J. Agric.*, **100**, 1, p. 28, 1960.

The following measures are recommended by the Dept Agric., Hastings, for restricting bitter pit [**39**, 476], which is normally most serious in Cox's Orange, Bledisloe Cox, Kidds Orange Red, and Golden Delicious: caution in use of N fertilizers (including fowl or sheep manure); pruning to induce only moderate growth, with encouragement of lateral fruiting; promotion of regular cropping; careful irrigation to maintain a steady development of the crop; and thinning of Cox's in heavy-crop

seasons (but normally moderate thinning to avoid larger fruit). Harvesting should be started 8–10 days later than has been usual, and packing completed rapidly, keeping fruit from young trees of susceptible vars. separate for the local market.

Okamoto (T.). **Studies on Apple scald. Part II. Analysis of volatiles and catecholase activities of Apple skin suffering from scald-like injury.**—*Bull. Fac. Agric. Hirosaki Univ.* 5, pp. 46–52, 1 graph, 1959. [Jap. Abs. from Engl. summ. 19 ref.]

In further studies [cf. **38**. 15] formic and acetic acids, methyl alcohol, acetaldehyde, and esters were identified by paper chromatography in the brown skins of apples stored at room temp. without any ventilation. This suggests a possible role of formic acid and esters in scald development.

Greenham (D. W. P.) & White (G. C.). **The control of magnesium deficiency in dwarf pyramid Apples.**—*J. hort. Sci.*, **34**. 4, pp. 238–247, 1959.

At East Malling Res. Sta., Maidstone, Kent, in each of 5 yr. 5 post-blossom applications of 2% $MgSO_4.7H_2O$ to Edward VII dwarf pyramid apple trees on M VII rootstocks effectively increased leaf Mg content, delayed the onset of deficiency symptoms, and markedly reduced their severity, while considerably improving cropping [cf. **36**. 452; **38**. 152]. The increased number of fruits may have been related to the control of early-season deficiency symptoms on the fruiting spurs. Low vol. applications were practicable, but appeared less effective than the usual sprays.

Mezzetti (A.). **Les principales pourritures des Pommes et des Poires pendant l'entreposage frigorifique.** [The chief rots of Apples and Pears in cold storage.] —*Rapp. gén. Congr. pomol., Florence-Ferrare, 1958*, pp. 54–65, 4 fig., [? 1960].

The author gives an account, based on many years' study, of the rots of apples and pears in cold storage in N. Italy caused by *Penicillium*, *Botrytis*, *Gloeosporium riessii*, and other *G.* spp. The importance of these fungi, their origin, conidial dispersal, ability to contaminate fruit, germination, penetration, vegetation within the fruit (or invasion), fructification upon the fruit (or 'evasion'), and control, mainly by prevention while the fruit is still on the tree, are dealt with.

[Also publ. (Ital.) in *Riv. Ortoflorofrutt. ital.*, **42**, 11–12, pp. 523–537, 1958.]

Boerema (G. H.) & Gremmen (J.). **Een oppervlakkige bastkanker bij Appel en Peer veroorzaakt door Pezicula corticola.** [A superficial bark canker of Apple and Pear caused by *P. corticola*.]—*Tijdschr. PlZiekt.*, **65**. 5, pp. 165–176, 5 fig., 1960.

The symptoms of this disease [surface canker] observed in the central Netherlands in the winter of 1958/9 agreed with those described by Jørgensen [**10**, 251]. Jonathan apple and Bonne Louise d'Avranches pear were seriously affected, while Cox's Orange Pippin was not attacked. 'Superficial bark canker' is proposed as the most suitable descriptive name. Following a review of the taxonomic literature it is concluded that *P. corticola* [**11**, 606] is the valid name for the perfect state, and *Cryptosporiopsis corticola* [*Myxosporium corticola*: see below] that for the conidial state. Both forms are described. The closely related fungus *P.* [*Neofabraea*] *malicorticis* [*N. perennans*: **38**, 90; **39**, 475] is also described, and the nov. comb. *C. curvispora* (Peck) Gremmen proposed for the imperfect state.

Ciferri (R.), Corte (A.), & Rui (D.). **La necrosi corticale delle Pomacee in Italia.** [Bark canker of Pomaceae in Italy.]—*Atti Ist. bot. Univ. Pavia*, Ser. 5, **17**, pp. 329–336, 1 pl., 1960. [Engl. summ.]

A description is given of the symptoms, geographical distribution, and causal

organism of surface canker of apple and pear, caused by *Pezicula corticola* (conidial state *Cryptosporiopsis pyri*) found on pear in the province of Verona in 1954 and on apple in Cuneo in 1959. What was probably the same disease was reported from Italy 1927–34 as due to *Cytospora microspora* [cf. **8**, 318]. The authors discuss their preference for the name *Dermatea corticola* [**3**, 405] to *Neofabraea corticola* [**10**, 272] for the ascigerous state and *Cryptosporiopsis pyri* to *Myxosporium corticola* [see above] for the conidial state.

Cropley (R.). **Pear blister canker : a virus disease.**—*Rep. E. Malling Res. Sta., 1959*, p. 104, 2 fig., 1960.

The virus in question (pear blister canker virus is proposed) [cf. **36**, 330] was transmitted by grafting from a symptomless tree of Beurré Hardy to Williams' Bon Chrétien, in which it caused slight epinasty of the leaves in the year after budding, blister cankers, phloem necrosis, and sometimes death in the following year.

Tomohisa (T.), Imamura (S.), & Tsuchiya (H.). **On Pear blight occurring in the Ina district of the Nagano Prefecture.**—Abs. in *Ann. phytopath. Soc. Japan*, **24**, 1, p. 18, 1959. [Jap.]

This blight occurred plentifully in pear orchards in 1957–8. There is no clear variation of the disease on Japanese pear vars.; it occurs on fully developed leaves, but not on young ones. Trees are attacked from June onwards when rain follows a protracted dry period. At first dark brown amorphous spots develop on the surface of the leaves, which gradually turn yellow brown, then the spots darken, the centres developing ring patterns. When severe, premature leaf fall results. The fungus forms pycnidia with colourless pycnidiospores, ellipsoidal to cylindrical, $4{\cdot}5–6 \times 2–2{\cdot}5\,\mu$, and containing 2–3 oil globules. On the basis of form, occurrence, and symptoms the causal agent is thought to be *Phyllosticta* sp.; *Alternaria* sp. has also been observed. Field trials show that Cu preparations are the most effective for control.

Tomohisa (T.) & Imamura (S.). **On the dispersal of ascospores of Phyllactinia pyri and chemical control. (Preliminary communication).**—Abs. in *Ann. phytopath. Soc. Japan*, **24**, 1, p. 18, 1959. [Jap.]

At Shimoina agric. branch exp. Sta., Nagano Prefecture, ascocarps of *P. pyri* [**16**, 633] were placed in the open and regularly examined under the microscope. The rate of ascospore dispersal was determined on the basis of the presence of asci. Dispersal began in late June with an av. temp. 20° C. and continued until about mid-July. Diseased leaves begin to appear from about the beginning of July and develop gradually. Rapid development was shown to take place from mid-Aug. into Sept., causing leaf fall. It is concluded that late June is the best time for chemical control, but in preliminary experiments S preparations proved very phytotoxic to Japanese pear vars. when used in periods of high temp. and are also very difficult to apply.

Billing (Eve), Crosse (J. E.), & Garrett (Constance M. E.). **Laboratory diagnosis of fire blight and bacterial blossom blight of Pear.**—*Plant Path.*, **9**, 1, pp. 19–25, 1 pl., 1960.

An account is presented of the methods developed by N.A.A.S., Wye, and East Malling Res. Sta., Kent, for the rapid laboratory identification of *Erwinia amylovora* [**38**, 267] and *Pseudomonas syringae* [**25**, 349]. Isolation of *E. amylovora* from infected primary and secondary blossoms, shoots, and active branch cankers and of *P. syringae* from cankers is followed by culture on yeastrel-peptone or sucrose agar, on which they can be recognized by their surface colony form. For confirmatory pathogenicity tests pear fruits are most satisfactory. *E. amylovora* causes

milky ooze production 2–4 days after inoculation and *P. syringae* local, dry, black lesions, sometimes taking a week to appear. Phage sensitivity tests and biochemical tests are also described and the whole recommended procedure is detailed. Of all the tests for fireblight diagnosis, pathogenicity in pear is probably the most useful.

Rodríguez (C.) & Heras (L.). **Clorosis calcárea de Membrilleros en relación con e ataque por 'Entomosporium maculatum Lév.'** [Lime chlorosis of Quince in relation to attack by *Fabraea maculata*.]—*An. Estac. exp. Aula Dei*, **6**, 1–2, pp. 106–109, 1959. [*Biol. Abstr.*, **35**, 3, p. 751, 1960.]

Quince vars. most resistant to lime chlorosis also displayed the lowest susceptibility to *F. maculata* [cf. **15**, 176, *et passim*].

Ogawa (J. M.) & English (H.). **Blossom blight and green fruit rot of Almond, Apricot and Plum caused by Botrytis cinerea.**—*Plant Dis. Reptr*, **44**, 4, pp. 265–268, 8 fig., 1960.

These diseases were serious in Calif. in abnormally wet weather in 1957 and 1958, sometimes causing more damage than *Sclerotinia laxa*, especially on Drake and Ne Plus Ultra almond and Santa Rosa plum. At Univ. Calif., Davis, inoculation of stone and pome fruit blossoms with *B. cinerea* induced infection. Penetration occurred at the junction between 2 epidermal cells of the petals and was facilitated by the presence of pollen grains. Inoculation of green apricot fruits [**32**, 24] with a spore suspension produced a rot only if the fungus had established itself on adherent floral parts, such as styles that failed to drop off. Two protective sprays with 10% N-phenylmercuriethylenediamine (23 Jan. and 20 Feb., 2·5 and 1 lb./100 gal.) gave good control of blossom blight on Ne Plus Ultra almond.

Bortels (H.) & Gehring (F.). **Untersuchungen über verwandtschaftliche Beziehungen zwischen einigen pflanzenpathogenen Pseudomonas-Stämmen unter besonderer Berücksichtigung von Pseudomonas morsprunorum Wormald, dem Erreger einer Steinobstbakteriose.** [Investigations of the relationships between some plant pathogenic *Pseudomonas* strains, with particular reference to *P. mors-prunorum*, agent of a bacteriosis of stone fruit.]—*NachrBl. dtsch. PflSchDienst, Stuttgart*, **12**, 1, pp. 7–12, 4 fig., 1960. [Engl. summ.]

At the Biologische Bundesanstalt, Institut für Bakteriologie, Berlin-Dahlem, isolates from leaves and twigs of *Prunus triloba*, prune plum, and plum, inoculated into tobacco, bean [*Phaseolus vulgaris*], elder, cherry, prune plum, and peach, induced symptoms similar to those of *P. mors-prunorum* from England [**35**, 779], a Hungarian str. of *P. syringae*, and several other pathogens of the *P.* group. The infections were not always successful, perhaps owing to changes in virulence or in the resistance of the host plants at different times and under different conditions. These findings, together with the results of physiological and serological tests, indicate that the German strains are to be referred to *P. mors-prunorum*.

In the authors' view *P. mors-prunorum* and certain other *P.* spp. should be included in *P. syringae* [cf. **36**, 654].

Ellenberger (Christina E.). **Heat inactivation of some viruses in Plum varieties and rootstocks.**—*Rep. E. Malling Res. Sta., 1959*, pp. 99–101, 1960.

Virus-infected plants of the scion plum vars. Victoria, Ontario, and Ruth Gerstetter and of Marianna and Common plum clonal rootstocks were kept at 37° C. [cf. **37**, 91] for 15–39 days; virus-free material was then propagated from growth made during the treatment. The viruses eliminated were plum bark split, plum line pattern, peach green mottle, and also an unidentified virus causing necrosis and mosaic in peach seedling indicators. The treatment eliminated the green mottle virus from entire plants of Victoria and Ontario but only from the shoot tips of Marianna.

Grosjean (J.). **Zijn Pruimen op eigen wortel resistenter tegen loodglansziekte dan Pruimen op onderstam?** [Are Plum varieties on their own roots more resistant to silver leaf than on rootstocks?]—*Meded. Dir. Tuinb.*, **22**, pp. 437–440, 1959. [Engl. summ.]

Own-rooted bushes of the plum vars. Victoria, Czar, Early Laxton, and Reine Claude d'Oullins were inoculated with *Stereum purpureum* [**36**, 330], together with an equal number of the same vars. on rootstocks, and the progress of the disease was observed for 2 yr. Victoria on Brompton and Czar on Common Mussel were less susceptible to the disease than when own-rooted; Victoria on Brompton had an unexpectedly high power of recovery. Early Laxton own-rooted and on Brompton were equally susceptible. Reine Claude d'Oullins own-rooted was less susceptible than on Bromptom. Possible differences in capability of selective uptake of some elements between the different root systems are suggested as an explanation.

KenKnight (G.). **Prunus injucunda Small and Acer rubrum L., natural hosts of Peach rosette virus.**—*Plant Dis. Reptr*, **44**, 3, p. 220, 1960.

Natural hosts of peach rosette virus detected by U.S. Dept Agric., Fort Valley, Ga, [cf. **39**, 117] are *Prunus angustifolia* [**37**, 668], hog plum (*P. injucunda*), and red maple (*Acer rubrum*). Experimental hosts included apricot, *P. hortulana*, and Methley plum (*P. salicina*).

Turner (W. F.) & Pollard (H. N.). **Insect transmission of phony Peach disease.** —*Tech. Bull. U.S. Dep. Agric.* 1193, 27 pp., 1 map, 1959.

Extensive surveys in S.E. U.S.A. since 1936 and transmission tests with phony peach virus have established that the leafhoppers *Homalodisca coagulata*, *Oncometopia undata*, *Cuerna costalis*, *Graphocephala versuta*, and *H. insolita* [**35**, 464] are vectors of about equal efficiency (24–33% transmission).

The virus is persistent, the latent period in the insect being 8–20 days. Insects probably remain infective until death. At least 1 sp. (*C. costalis*) can retain the virus for as long as 144 days during semihibernation. Nymphs can acquire the virus, and a case of nymph transmission (*O. nudata*) to peach is recorded.

As few as 2 adult insects may effect transmission, but attempts with single insects have failed. The only important natural vectors are *H. coagulata* and *O. undata*, which feed regularly on peach; *G. versuta* is an occasional visitor.

The full period of natural spread has not been determined, though transmission is known to occur between 1 May and 31 Aug., with the greatest activity probably in June and July.

Turri (E.). **Prove sperimentali condotte nel 1958–1959 in provincia di Roma sull' impiego di alcuni acuprici contro la Taphrina deformans (Berk.) Tul.** [Experiments during 1958–9 in the province of Rome on the use of some non-copper materials against *T. deformans*.]—*Boll. Staz. Pat. veg., Roma*, Ser. 3, **17** (*1959*), 1, pp. 91–111, 3 fig., 2 graphs, 1960. [Engl. summ. 28 ref.]

Peach trees in an orchard near Rome were sprayed against *T. deformans* [cf. **38**, 123] on 30 Dec. 1958 with 3% Bordeaux mixture and fruttene (80% ziram), manzate, and orthocide 50, each at 0·8%; a further application was made on 12 Feb. 1959 at 0·75 and 0·6%, respectively. Fruttene and Bordeaux gave about equally good control, with significantly better results than manzate and orthocide. No definite conclusion could be formed about the effect of the materials on *Coryneum beijerinckii* [*Clasterosporium carpophilum*: loc. cit.]. The use of ziram against *T. deformans* on peach offers various technical advantages and is recommended.

Sarasola (A. A.) & De Sarasola (Maria A. R.). **Nuevos tratamientos contra el torque del Duraznero en la Argentina.** [New treatments against Peach leaf curl

in Argentina.]—*Rev. Invest. agric. B. Aires*, **13**, 1, pp. 111–116, 1959. [Engl. summ.]

In a fungicide trial against *Taphrina deformans* [**35**, 772] in the Mercedes Province, 1·25 and 2% Bordeaux, 0·36% ziram, and 0·25% ferbam gave good results, whether applied just before bud swell or after leaf fall; the later spray also helps to control *Coryneum* [*Clasterosporium*] *carpophilum*.

Pratella (G.) & Kovács (A.). **Attività sistemica del solfato di 8-ossichinolina in giovani piante di Pesco.** [Systemic activity of 8-oxyquinoline sulphate in young Peach plants.] –*Ann. Sper. agr.*, N.S., **14**, 2, pp. 171–183, 6 fig., 1960. [Engl. summ.]

At the Osservatorio per le Malattie delle Piante, Bologna, Italy, it was established that 8-oxyquinoline sulphate became systemic in 2 yr.-old Hale peach plants via the roots. *In vitro* the substance exerted a fungistatic effect on *Stereum purpureum* at 3×10^4. Further work is required to confirm these results and to study the practical application of them.

Avakyan (S. A.). Патогенные свойства возбудителей усыхания Персиковых деревьев. [The pathogenic characters of the causal agents of Peach tree desiccation.] –Микробиол. Сборн. Акад. Наук Армян. ССР [*Mikrobiol. Sborn. Akad. Nauk Armyan. S.S.R.*], *1958*, 10, pp. 123–133, 1958. [Arm. summ. Abs. in *Referat Zh. Biol.*, *1960*, 3, p. 187, 1960.]

It was shown by repeated inoculations that the desiccation of peach trees observed in the Armenian S.S.R. is a complex disease involving 2 new forms *Dothiorella stomatica* f. *persicae* and *Bacterium dissolvens* f. *persicae* [see below].

Avakyan (S. A.). О некоторых биологических особенностиях возбудителей усыхания Персиковых деревьев. [On some biological features of the causal agents of Peach tree desiccation.] –Микробиол. Сборн. Акад. Наук Армян. ССР [*Mikrobiol. Sborn. Akad. Nauk Armyan. S.S.R.*], *1958*, 10, pp. 135–145, 1958. [Arm. summ. Abs. in *Referat. Zh. Biol.*, *1960*, 4, p. 188, 1960.]

Dothiorella stromatica f. *persicae* and *Bacterium dissolvens* f. *persicae* [see above] on 5% wort agar required almost identical pH conditions for growth. Strs. of *D. stromatica* f. *persicae* had toxic properties, best demonstrated on potato extract with 3% glucose and peach extract.

Yamaucchi (K.), Shiomi (M.), & Okamoto (Y.). **On Peach anthracnosis latent in the leaves.**—Abs. in *Ann. phytopath. Soc. Japan*, **24**, 1, p. 19, 1959. [Jap.]

Peach anthracnose [*Gloeosporum laeticolor*: **32**, 436] spots all young leaves, but is seldom seen on old leaves. At Okayama agric. exp. Sta. in June–Aug. 1957 conidiophore masses developed on some 82% of curled leaves from infected trees 5–7 days after storage in a damp chamber. The fungus developed equally on the stalk, mid-rib, and leaf blade of curled leaves. To secure isolates from them the time required for sterilization in $HgCl_2$ alcohol was 1–5 min., but the percentage of the fungus obtained was substantially higher with 2 min. immersion, indicating that it does not only adhere to the leaves, but is also capable of latent invasion in the hyphal state.

Daines (R. H.), Haenseler (C. M.), Brennan (E.), & Leone (I. A.). **Rusty spot of Peach and its control in New Jersey.**—Abs. in *Phytopathology*, **50**, 4, p. 239, 1960.

This disease [**36**, 331], observed on Rio Oso Gem, Summer Queen, and Goldeneast, was controlled on Goldeneast in 1957 and 1958 by S treatments (though not by other fungicides used). It appears to be caused by a pathogen that kills the surface

cells of the fruit but cannot sporulate freely in the dead host cells. Superficial hyphae were found near the edge of new lesions, but no spores or hyphae in the bald centre of older spots.

KITAJIMA (H.) & KISHI (K.). **On spring canker as an initial source of infection by bacterial shot hole of Peach.**—Abs. in *Ann. phytopath. Soc. Japan*, **24**, 1, p. 19, 1959. [Jap.]

Studies at the Tōkai-Kinki agric. exp. Sta., in spring 1958 confirmed the importance of spring cankers in initiating infection by *Xanthomonas pruni* in Japan [cf. **34**, 732]. For the most part spring canker is comparatively mild, and is found on weak 1-yr.-old branches. Symptoms are visible from late March. The surface is initially purple-red, gradually enlarging, the epidermis swells somewhat, and finally cracks develop from which the bacteria emerge. In severe cases the parts between the affected area of the shoot and the tip may wither. These conditions persist from early to mid-May when a strong protective zone develops at the circumference of the swollen area. Desiccation and excoriation follow and the bacteria inside the affected area perish.

DIMARCO (G. R.). **A study of the control of post-harvest decays of Strawberries and Peaches.**—*Diss. Abstr.*, **20**, 6, p. 1951, 1959.

A more detailed account is given from Rutgers Univ. of rot control [**37**, 93]. Mycostatin (nystatin) at 100 p.p.m. and dowicide A-M 245 (sodium *o*-phenylphenate) at 1,000 p.p.m. applied in the cooling water of a hydrocooler or on prepackaged peaches were the most effective of several chemicals in controlling brown rot [*Sclerotinia fructicola*] and *Rhizopus* [*stolonifer*] rot [cf. **39**, 182] of harvested peaches. The losses caused by rots in fresh fruits and vegetables amounts to over a billion dollars annually in U.S.A. Dowicide, which has been approved as a post-harvest treatment on peaches by the Food and Drug Administration, is expected to gain widespread use. The chemicals were effective only within 9 hr. of harvesting before the fungi penetrate the peach surface.

Mycostatin at 100 p.p.m. substantially reduced primary *Botrytis* and *Rhizopus* rots of strawberries [**38**, 21, 93] when used as a dip or in the cooling water of a hydrocooler. Captan at 1,200 p.p.m. was more effective but left an objectionable residue on the fruit: it has been approved as a post-harvest treatment for strawberries by F.D.A.

KEMP (W. S.). **Zinc deficiency of Newcastle Apricots.**—*N.Z.J. Agric.*, **99**, 6, pp. 585, 589, 4 fig. (1 col.), 1959.

Already noticed [**39**, 117].

LOTT (T. B.) & KEANE (F. W. L.). **The host range of the virus of twisted leaf of Cherry. The association of the virus diseases twisted leaf of Cherry and ring pox of Apricot.**—*Plant Dis. Reptr*, **44**, 4, pp. 240–242; pp. 243–245, 1960.

At Canada Agric. Res. Sta., Summerland, B.C., inoculation with 4 selections of cherry twisted leaf virus [**36**, 333] from naturally infected trees induced symptoms in vars. of sweet cherry, and infected without symptoms 2 vars. and also sour cherry, peach, chokecherry (*Prunus virginiana*), rootstock seedlings (*P. mahaleb*), and apricot. The apricot trees inoculated with 3 of the selections developed symptoms of apricot ring pox virus [cf. **38**, 704]. Plum, wild cherry, 4 vars. of apple, and 1 of pear failed to become infected by twisted leaf.

The 2nd paper notes that both diseases have existed together and spread in the Okanagan Valley for some years. Reciprocal experiments in which cherry trees naturally infected by twisted leaf were indexed on apricot and apricot infected by ring pox indexed on cherry demonstrated the presence of both viruses in large

numbers of both hosts. A close association between them in commercial orchards was indicated. There is a probability that both diseases are caused by the same virus, but this has yet to be proved.

Posnette (A. F.) & Cropley (R.). **Virus diseases of Cherry trees in England. III. Crop reduction caused by some viruses.**—*Rep. E. Malling Res. Sta., 1959*, pp. 92–95, 2 graphs, 1960.

These trials [cf. **36**, 198] indicate that virus infection of cherry trees is of greater importance than hitherto believed. The cropping of mature Early Rivers was reduced by 72% when affected by necrotic line pattern, caused by inoculation with 'recurrent' necrotic [peach] ring spot and sour cherry yellows viruses [cf. **37**, 91], and by 52% by tatter leaf [cf. **33**, 611] caused by 'non-recurrent' peach ring spot and sour cherry yellows viruses. The corresponding reductions for mature Turkey Heart trees were 73 and 37%, respectively. Yields of young Early Rivers, Napoleon, and Merton Bigarreau were also reduced by European [cherry] rusty mottle [loc. cit.] and European [cherry] rugose mosaic viruses, and by tatter leaf and necrotic line pattern. Young Merton Heart trees, however, cropped more heavily after inoculation, perhaps because of a rough bark condition of unknown cause, which was more severe on vigorous trees than on those stunted by virus infection.

Kegler (H.). **Zur Differenzierung von Kirschenviren. I. Die Viren der Pfeffinger (Rosetten-) und der Stecklenberger Krankheit.** [On the differentiation of Cherry viruses. I. The viruses of the Pfeffinger (Rosette-) and Stecklenberg diseases.]—*Phytopath. Z.*, **38**, 2, pp. 209–213, 6 fig., 1960.

At the Inst. für Phytopathologie, Aschersleben, Germany, following mechanical transmission of a mixture of Pfeffinger [cherry rasp leaf virus: **39**, 332] and Stecklenberg [? peach ring spot virus str.: **39**, 425] viruses only the former could be reisolated from *Chenopodium foetidum*, *Datura stramonium*, *Ocimum basilicum*, and *Solanum sisymbriifolium*. Stecklenberg virus can be differentiated by its symptoms on *Ammi majus*, in which Pfeffinger virus is latent.

Pfaeltzer (Hildegonda J.). **'Rosetziekte' of Cherry, transmitted from herbaceous hosts to Cherry seedlings.**—*Tijdschr. PlZiekt.*, **66**, 1, pp. 24–26, 2 fig., 1960. [Dutch summ.]

Using various mechanical methods the author re-transmitted the virus of cherry rosette (Pfeffinger disease) [cherry rasp leaf virus: cf. above] from cucumber and tobacco [**38**, 530] to cherry seedlings. In general, the incidence of infection was rather low; the max. was secured by injection of sap into the stems, but the lower rate due to rubbing the leaves with sap and carborundum was offset by the rapid appearance of symptoms (within 1 mon. compared with over 1 yr. for injection).

Van der Meer (F. A.). **Onderzoekingen betreffende Besseviren in Nederland. I. Lepelblad van Rode Bes.** [Studies relating to Currant viruses in the Netherlands. I. Spoon leaf of Red Currant.] *Tijdschr. PlZiekt.*, **66**, 1, pp. 12–23, 9 fig., 1960. [Engl. summ. 22 ref.]

Reported for the 1st time from the Netherlands in 1926 and already known on the predominantly light clay soils in the important fruit-growing region of the Bangert (N. Holland) since 1920, the symptoms of spoon leaf in red currant are somewhat similar to those of reversion in black currant [**7**, 182 *et passim*], but the author's experiments have revealed unmistakable differences. A typical feature of spoon leaf is the almost circular shape of the leaf and virtual absence of marginal indentations. Fay's Prolific (often mixed with the almost indistinguishable and also highly susceptible Versailles Rouge) is the only var. cultivated locally, but Laxton's

Perfection reacted positively in sap inoculation tests. The virus was also transmitted by the same method to White Burley tobacco, *Nicotiana rustica*, tomato, cucumber, *Chenopodium amaranticolor*, China aster, and beet, inducing symptoms of the tobacco ring spot type. In 1 test it was re-transmitted to currant from *N. rustica*. In some grafted plants (red currant on black), as well as in the sap-inoculation experiments, the spoon-leaf symptoms were preceded by a mosaic which subsequently disappeared, and the same sequence is often found in natural infection. Hence it is inferred that the mosaic is a primary symptom of spoon leaf, both being attributable to the same virus.

In some plantations spoon leaf was found to be spread by the use of diseased planting material, but it is clear that new infections also occur. An accumulation of affected plants in a mapped planting of 2,500 bushes suggested the agency of a slowly spreading wingless carrier. No evidence of transmission through the soil has been obtained.

Further studies are required to settle the question of connexion between spoon leaf and 2 other red currant viruses causing comparable symptoms, namely, Hildebrand's tomato ring spot in U.S.A. [**21**, 495] and a ring spot virus isolated by Klesser in England [**31**, 245] from bushes originating in the Netherlands.

Varney (E. H.) & Raniere (L. C.). **Necrotic ringspot, a new virus disease of cultivated Blueberry.**—Abs. in *Phytopathology*, **50**, 4, p. 241, 1960.

This disease of highbush blueberry [*Vaccinium corymbosum*] appeared on var. Pemberton near Tauton Lakes, N.J., in 1955. Infected plants are stunted and die back. Chlorotic spots, rings, and line patterns appear on new leaves and the chlorotic areas may become necrotic and fall out, causing leaf tatter. Leaves may be malformed. The disease was transmitted in the greenhouse by chip budding at budbreak, symptoms appearing in 2–4 weeks. Mechanical transmission to a number of standard test hosts was readily achieved.

Hutchinson (M. T.), Goheen (A. C.), & Varney (E. H.). **Wild sources of Blueberry stunt virus in New Jersey.**—*Phytopathology*, **50**, 4, pp. 308–312, 8 fig., 1 map, 1960.

Surveys by the U.S. Dept Agric. and N.J. agric. Exp. Sta., New Brunswick, revealed widespread infection of wild *Vaccinium* spp. in N.J. by vaccinium stunt virus [cf. **34**, 465] and the virus was transmitted from these to cultivated *V. corymbosum* by grafting and to *Vinca rosea* by dodder. The distribution of the virus on the wild spp. indicates that it is indigenous and has spread thence to cultivated spp.

Takamura (Y.), Shimomura (T.), & Hirai (T.). **The nucleic acids concentrations in Mulberry leaves as affected by dwarf disease.**—*Phytopath. Z.*, **38**, 2, pp. 123–128, 5 graphs, 1960. [Germ. summ.]

Studies at Nagoya Univ., Anzyo, Aichi-Ken, Japan, showed that whereas the conc. of nucleic acids in healthy mulberry trees was higher in the top leaves than in the lower, leaves of trees affected by dwarf (?) virus disease [mulberry mosaic virus: cf. **18**, 719] had the same conc. throughout, in general the top leaves having a lower conc. than healthy.

Klement (Z.), Lovrekovich (L.), & Hevesi (M.). **Studies on the biochemistry, phage sensitivity and serological properties of Pseudomonas pathogenic to Mulberry.**—*Phytopath. Z.*, **38**, 1, pp. 18–32, 2 fig., 1960. [Germ. summ.]

Bacteria isolated from blighted mulberry shoots from various regions of Hungary and studied at the Res. Inst. for Plant Protection, Budapest, fell into 2 groups on the basis of biochemical and serological properties and phage activity. One group was identified as *P. mori* [**20**, 433], the other appears to be a new var., *P. mori* var. *huszi*, the pathogenicity of which is identical with that of *P. mori*.

Legg (J. T.). **A virus-degeneration of Loganberry.**—*Rep. E. Malling Res. Sta., 1959*, pp. 102–103, 2 fig., 1960.

A virus, for which the name loganberry degeneration is proposed, was detected in weak loganberry plants, but never in vigorous ones. It produced symptoms of chlorosis and shortening of the internodes in *Rubus henryi*, but not in other *R.* hosts tested, and depressed both cane wt. and yield of inoculated plants of 460/2. A vigorous virus-tested stock, LY_{59}, is now available.

Lister (R. M.). **Strawberries and soil-borne virus diseases.**—*Agriculture, Lond.*, **67**, 1, pp. 25–29, 2 pl., 1960.

Reviewing the prevalence, effects, and importance of soil-borne viruses attacking strawberry plants [**38**, 19] the author points out that all 3, viz. arabis mosaic [cf. **39**, 427] raspberry ring spot [raspberry Scottish leaf curl virus: cf. **39**, 261], and tomato black ring [loc. cit.], affect raspberry, French bean [*Phaseolus vulgaris*], lettuce, cucumber, sugar beet, and a large number of common weeds; tomato black ring, in addition, affects oats and potatoes. All 3 are transmitted by microscopic soil-inhabiting organisms. The English, Scottish, and Welsh counties in which indigenous outbreaks of soil-borne virus diseases of strawberry have occurred are listed, and a table is given showing the susceptibility of 15 strawberry vars. grown in Britain to the 3 diseases. Symptoms of soil-borne viruses on strawberry may easily be confused with other forms of injury, such as those due to aphids or to mineral deficiencies.

Regarding the certification of sound stock it is noted that soil-borne viruses may remain in the roots of certain strawberry vars. for 1 yr. or more without leaf symptoms appearing. The viruses can also be disseminated in infected seeds of the various host plants, including weeds, but it is not yet known how important this means of spread may be.

Cropley (R.), Ellenberger (Christina E.), & Jha (A.). **Strawberry mosaic and Apple mosaic virus in Strawberry.** *Rep. E. Malling Res. Sta., 1959*, pp. 96–97, 3 fig., 1960.

Sap transmission to herbaceous plants, including cucumber and *Chenopodium amaranticolor*, together with plant protection tests in *Petunia hybrida*, and tests with specific antiserum, indicate that strawberry mosaic in Royal Sovereign is caused by certain strs. of the soil-borne raspberry yellow dwarf (arabis mosaic) virus [cf. above]. Apple mosaic, an apparently unrelated virus, caused similar symptoms when graft-transmitted to strawberry [cf. **37**, 132].

Posnette (A. F.) & Jha (A.). **The use of cuttings and heat treatment to obtain virus-free Strawberry plants.** —*Rep. E. Malling Res. Sta., 1959*, p. 98, 1960.

After being kept at 37° C. for 2–3 weeks [cf. **38**, 93], Cambridge Favourite and Huxley's Giant strawberry plants were subjected to the crown-sectioning procedure of Smith & Harland (*Grower*, **49**, pp. 549–550, 1958). Some of the plants raised from the 0·5–1 cm. disk cuttings were free from [strawberry] crinkle virus, and probably from [strawberry] vein chlorosis virus as well, while both viruses persisted in entire plants kept at 37° for up to 40 days.

Schöniger (G.). **Über die durch das Erdbeernekrosevirus bedingten anatomischen Veränderungen in Fragaria vesca L.** [On the anatomical changes in *F. vesca* induced by the Strawberry necrosis virus.]—*Naturwissenschaften*, **47**, 8, pp. 189–190, 1960.

On the basis of the following observations at the Institut für angewandte Botanik, Univ. Würzburg, Germany, it was concluded that the primary symptoms in the

parenchyma of *F. vesca* (East Malling clone) infected by strawberry necrosis virus [**38**, 20], leading to changes in the assimilatory and conducting tissues, are connected with the transport of assimilates. The symptoms in the petioles and leaf blades develop first in unfolded leaves. After the primary shock has subsided they appear in unthrifty plants (grown at low temp. and short day-length) and subsequently in vigorous ones cultivated under the opposite conditions. An alleviation of the symptoms by full manuring was noticed. In the peduncles primary symptoms occur only outside the cylinder of vascular bundles. Moreover, pathological changes in extensive portions of the tissue are found only where the cells of the phloem fibres have retained a more or less parenchymatous character. The same remarks apply to the first 2 internodes of the runners, the internal structure of which is like that of the peduncle. The only anatomical changes in the shoot cortex are an extension of the parenchymal necroses in the lower leaf; new foci of infection cannot originate there.

In the vascular bundle sheaths primary alterations may be detected in the stipules of the 3rd and 4th leaf primordia. Also to be included in the category of primary changes are the necroses in the stem medulla. No anatomical alterations could be found in the roots.

Razvyazkina (Mme G. M.). Вирусное позеленение лепестков Земляники и его распространение. [Strawberry green petal virus and its dissemination.]—*J. agric. Sci., Moscow*, **5**, 2, pp. 139–140, 1960. [Engl., Germ., Fr. summ.]

This virus, not previously known in the Soviet Union, was identified by the Moscow Sta., All-Union Inst. for Plant Protection, in the summer of 1958 at the State farm Ermolino, Dimitrievsk area, Moscow region. The disease is not widespread and infected clones are rare. A similar greening of petals was noted in wild clover [cf. **37**, 243] adjacent to the strawberry bed. In a previous study (*Zool. Zh.*, **38**, 3, 1959) the author established that *Aphrodes bicinctus* is the vector. In greenhouse transmission tests using *A. bicinctus* and the wood strawberry (*Fragaria vesca*) raised from seed, 10 plants were infected after the insects had fed on affected clover. Symptoms appeared after 55–60 days. These were marginal and vein chlorosis, leaf deformation, abnormal development of leaf lobes. After 3–3·5 months the plants looked like dense rosettes of sharply dotted leaves. All plants soon died. Tests demonstrated that red and white clover were equally susceptible to infection by *A. bicinctus*. Other plants are also a source of infection. Symptoms on clover leaves were visible only in the year of infection and the leaves were externally normal the following year, except for the characteristic viridescence. Infected strawberry clones should be removed and weeds and clover near strawberry beds destroyed. Dusting with DDT should be used to control the insect vector.

Khan (Md. A. R.). **The perithecial stage of Sphaerotheca humuli on Strawberry.**—*Plant Path.*, **9**, 1, p. 18, 1 pl., 1960.

In the summer of 1959 perithecia of *S. humuli* were observed on heavily mildewed Royal Sovereign strawberry plants in an unheated greenhouse at Long Ashton, Bristol. Seen first on the peduncles, they subsequently developed on the pedicels of individual fruits, on sepals attached to withered fruits, and on stolons, but not on other parts of the plants.

Wright (W. R.), Smith (M. A.), Ramsey (G. B.), & Beraha (L.). **Gloeosporium rot of Strawberry fruit.**—*Plant Dis. Reptr*, **44**, 3, pp. 212–213, 2 fig., 1960.

Apparently the 1st record in the U.S.A. (at Amite, La) of *Gloeosporium* sp. [cf. **38**, 21] on strawberry, from the U.S. Dept Agric.; the spores measured 3–5 × 9–19 (av. 4·8 × 14) μ.

Bernaux (P.) & Lhérault (P.). **Un dépérissement du Fraisier dans l'Aveyron.** [A die-back of Strawberry in the Aveyron region.]—*C. R. Acad. Agric. Fr.*, **44**, 15, pp. 786–787, 1958.

In the Dept of Aveyron, France, heavy losses are caused by a disease of strawberries which first appears in 3–4-yr.-old plants; these become stunted, produce few stolons and few, malformed, fruits, and die during hot weather or drought. The lower part of the rhizome is rotted, and the central cylinder of the rhizome, but not of the roots [cf. **19**, 608], is discoloured pink to blood-red. Work is in progress to determine whether the agent is *Phytophthora fragariae* [**33**, 523]. The disease is less severe elsewhere in France, perhaps because the crop is replanted more frequently.

Stover (R. H.) & Waite (B. H.). **Studies on Fusarium wilt of Bananas. V. Pathogenicity and distribution of F. oxysporum f. cubense races 1 and 2.**—*Canad. J. Bot.*, **38**, 1, pp. 51–61, 1 pl., 1 fig., 1960. [15 ref.]

In further studies [cf. **39**, 434] naturally occurring races 1 and 2 of *F.o.* f. *cubense* causing Panama disease of bananas have been identified. Race 1, of world wide distribution, attacks certain AAA triploids of *Musa acuminata*, of which Gros Michel is the most important, and *M. textilis*. Race 2, identified in Honduras, El Salvador, Puerto Rico, Virgin Islands, and the Dominican Republic, attacks the ABB triploids of *M. acuminata* × *M. balbisiana* (Chato, Bluggoe, Rulo, or Chamaluco 'plantains'). Both races are pathogenic to 3–4 month old seedlings of *M. balbisiana*, *M. schizocarpa*, and *M. acuminata* ssp. *banksii*, but race 1 proved the more so; mature *M. balbisiana* is immune from rhizome infection in the field. Race 1 includes the Odoratrum and Inodoratum 'cultivars' of *F.o.* f. *cubense* [loc. cit.], race 2 the Inodoratum only. Race 2 probably developed independently in different localities. As the ABB triploids, susceptible to this race, hybridize and set seed with pollen of *M. bassiana* (BB) and *M. acuminata* (AA), the ancestors of the cultivated banana, this will facilitate the study of inheritance of resistance to the 2 races.

Marshall (K. C.) & Alexander (M.). **Competition between soil bacteria and Fusarium.**—*Plant & Soil*, **12**, 2, pp. 143–153, 2 pl., 1960. [16 ref.]

At Cornell Univ., Ithaca, N.Y., mixed cultures of *F. oxysporum* f. *cubense* from banana with several different soil bacteria were studied in liquid media and on sterile soil. With most of the bacteria suppression of the fungi resulted from a biologically induced N deficiency, this effect being reversed by the addition of excess inorganic N. High populations of competitors occurred in 2 soils of neutral pH. No isolates were inhibitory in acid San Alejo loam from Honduras but *Agrobacterium radiobacter* was able to compete when the loam was limed to pH 6·6. Inhibition by Gram+, spore-forming rods could not be accounted for in terms of competition for nutrients or by antibiotic production in artificial media.

The competitive ability of *A. radiobacter* in 12 Central American soils was related to pH in more acid and neutral environments, competition being slight or absent at pH $\leqslant$ 5·7 and pronounced at 7·4–7·5, but was correlated with texture, organic-matter content, and total N in soils of intermediate pH (4·9–6·8). In all soils in which inhibition occurred the effect was overcome with inorganic N. Excluding *Bacillus* spp., the competitive ability of soil bacteria was related to their capacity to develop in the absence of amino acids and growth factors; it could not be correlated with their growth rates in soil or liquid medium.

Blake (C. D.) & Walker (J.). **Pineapple wilt.**—*Agric. Gaz. N.S.W.*, **70**, 12, pp. 638–641, 5 fig., 1959.

The symptoms of this disease, which are described from the Dept Agric., are wilting, root destruction, stunting and failure of plants to make satisfactory growth, and

fruit malformation, listed in decreasing order of importance in N.S.W. Although many different fungi have been found in association with pineapple roots in the surrounding soil, *Phytophthora cinnamomi* [**37**, 205] alone has been recovered from the roots of wilted plants and has not been found in the roots of healthy plants. Laboratory experiments have shown that this fungus is capable of producing a root rot, and is possibly a major cause of this disease, with insects and nematodes as contributory agents.

KANAPATHY (K.). **Visual symptoms of major nutrient deficiencies of the Singapore Spanish Pineapple.**—*Malay. agric. J.*, **42**, 3, pp. 157–160, 2 col. pl., 1 fig., 1959.

The results are described of tests in which either N, P, K, Ca, or Mg was withheld from the complete nutrient solution.

CIFERRI (R.). **Segnalazione della batteriosi del Mango nel Giuba (Somalia).** [Report of a bacterial disease of Mango in the Juba Valley, Somaliland.]—*Atti Ist. bot. Univ. Pavia*, Ser. 5, **17**, pp. 167–170, 1 pl., 1960. [Engl. summ.]

An angular leaf spot of the leaves, twigs, and fruits of mango is described. A bacterium measuring $1{\cdot}5–2 \times 0{\cdot}5\,\mu$ was present in the lesions, but was not isolated. The disease is similar to that reported from S. Africa [cf. **17**, 121] and India [cf. **36**, 518; **37**, 202].

ZACHOS (D. G.) & MAKRIS (S. A.). **Recherches sur le Gloeosporium olivarum Alm. en Grèce. I. Biologie du champignon.** [Research on *G. olivarum* in Greece. I. Biology of the fungus.]—*Ann. Inst. phytopath. Benaki*, N.S., **2**, 1, pp. 24–42, 1 pl., 6 graphs, 1959.

Black but not green olive fruits, whether injured or not, became infected on inoculation with spores of *G. olivarum* [**38**, 559; **39**, 88 *et passim*], which germinated best at 10–25° C. and 100 (opt.)—92% R.H. The incubation period at 25° varied from 4 to 6 days according to the mode of inoculation. The ability to germinate was considerably reduced after 15 days' storage in the shade under natural conditions and lost after 30 days. For mycelial growth 25° was the opt., though 20° was almost equally favourable.

DÉMÉTRIADÈS (S. D.). **Sur la nutrition du Gloeosporium olivarum Alm.** [Concerning the nutrition of *G. olivarum*.]—*Ann. Inst. phytopath. Benaki*, N.S., **2**, 3, pp. 159–183, 10 graphs, 1959.

Modifications of the ingredients of Richards's solution used as a nutrient for cultures of *G. olivarum* [see above] gave a vigorous growth when KNO_3 was less than normal (0·5–1 g./l.), while the $MgSO_4.7H_2O$ and KH_2PO_4 content proved to have little effect. Of various dilutions, 1/40 ensured the max. production of dry matter. Aspartic and glutamic acids, glycine, peptone [cf. **38**, 244], urea, tyrosine, and KNO_3 at low doses were all suitable sources of N. Concs. of glucose up to 8% gave an increase of dry matter, and saccharose, fructose, mannose, and galactose were equally effective, maltose somewhat less, and lactose, starch, dextrin, and glycerin less still. An initial pH 2 of the Richards's solution prevented growth entirely, while 3–10 ensured normal development with the opt. clearly around 6–7 as the culture matured.

GAMBOGI (P.). **Primi risultati dell' impiego dei composti acuprici nella lotta contro il cicloconio dell' Olivo in alcune zone della Toscana litoranea.** [First results of the use of non-copper compounds in the control of *Cycloconium* of the Olive in certain parts of the Tuscan seaboard.]—*Agricoltura ital.*, **59** (N.S. **14**), 5, pp. 178–186, 1959.

From Univ. Pisa, the author reports that in tests in the Provinces of Lucca and

Massa against *Cycloconium* disease of olive [*C. oleaginum*: **38**, 270, 415, *et passim*] non-Cu compounds containing zineb gave some degree of control though this effect was less marked where infection was very severe.

Prota (U.). **Contributi alla patologia dell' Olivo coltivato in Sardegna. I. Osservazioni ed indagini sull' 'occhio di pavone' indotto da Cycloconium oleaginum Cast.: epoca dell' infezione, comparsa delle macchie, evoluzione delle medesime; filloptosi; conidiogenesi.** [Contributions to the pathology of the Olive cultivated in Sardinia. I. Observations and researches on 'peacock's eye' caused by *C. oleaginum*: period of infection, appearance of the spots, their development: leaf shedding: conidial production.] —Reprinted from *Studi sassaresi*, Sez. III, **6** (*1958*), 35 pp., 4 graphs, 1959. [Engl. summ.]

A full account is given of studies at Univ. Sassari, Sardinia, on leaf fall of olive caused by *C. oleaginum* [**38**, 484 and above] in relation to the periods during which infection occurs, the development of the leaf spots, and conidial formation on leaves still attached to the tree or fallen to the ground, the data obtained being correlated with meteorological conditions. Infection is greatest between summer and autumn and between winter and spring. Leaf fall may occur at any season, but is more marked at some periods. At all seasons the conidia average 16·86–19·67 × 8·43 μ. On fallen leaves conidia form only for 10 days after leaf fall and in conditions of high humidity.

Brewing trials of wilt-tolerant Hops for the seasons 1952–57. Submitted by the Hops Advisory Committee.—*J. Inst. Brew.*, N.S., **57**, 3, pp. 207–212, 1960.

Of 5 vars. (bred at Wye agric. Coll. and E. Malling Res. Sta.) tested and known to be tolerant of wilt [*Verticillium alboatrum*: **38**, 561, 613], 1 (C. 2) proved to be unsuitable as a copper hop replacement for Fuggles. The others, viz. Density (D. 1), Defender (D. 3), Bramling Cross (OT. 48), and Janus (J. 2), were acceptable to most of the brewers participating in the trials when used at a 25% substitution rate in their normal hop grists. Several considered them suitable at 50% substitution, and a few brewers expressed willingness to replace their normal hop grist entirely by one or other of the vars., all of which are also tolerant of hop mosaic virus.

Ogawa (J. M.), McCain (A. H.), & Hall (D. H.). **Streptomycin absorption in diseased and healthy Hop tissues and its effect on the Hop downy mildew organism and mildew development.**— *Phytopathology*, **50**, 4, pp. 278–280, 1 fig., 1960.

Data from Dept Plant Path., Univ. Calif., Davis, showed that spray application of 1,000 p.p.m. streptomycin to California Cluster hops was ineffective against *Pseudoperonospora humuli* [cf. **37**, 103]. There was greater accumulation of the antibiotic in leaves and stems of diseased than of healthy plants (200 and 40 p.p.m., respectively, compared with 100 and 10). Fine sprays gave a higher conc. in the tissues than did coarse ones. Chlorosis was directly related to the streptomycin conc. in sprayed tissues.

Berry (S. Z.). **Comparison of cultural variants of Alternaria sesami.**—*Phytopathology*, **50**, 4, pp. 298–304, 7 fig., 1 graph, 1960.

At U.S. Dept Agric., Beltsville, Md, *A. sesami* [cf. **39**, 32] caused damping-off of Kansas 10 sesame seedlings sprayed with a culture suspension in the greenhouse; dark-brown to black water-soaked lesions developed, followed by shrinkage of tissue, on stems and leaves. On older plants the leaf spots were up to 2 cm. diam. Intensity of the symptoms varied with different isolates. The disease caused considerable damage to the normally resistant Venezuela 51 when plants were

maintained in a moist atmosphere for 3 days after inoculation. There was no evidence of pathogenic specialization among 10 isolates and 11 sesame strs.; isolates varied in their reduction of seedling emergence, though this effect was not related to their pathogenicity to foliage and there was no specificity for different host strs. in their attack on germinating seed. Cultural differences separated the isolates into 5 groups with opt. growth temps. ranging from 20° to 30° C. The spores of all isolates were similar and borne singly or occasionally in groups of 2 or 3. Sesame isolates were non-pathogenic to other crop plants inoculated and *A. solani* from tomato and potato and *A. cucumerina* from cucurbits did not attack sesame. All the sesami isolates are considered to be cultural variants of *A. sesami* [**38**, 325].

Ferrer (J. B.). **The occurrence of angular leaf-spot of Sesame in Panama.**—*Plant Dis. Reptr*, **44**, 3, p. 221, 1 fig., 1960.

The 1st record in Panama of angular leaf spot (*Cercospora sesamicola*) [cf. **38**, 613] of sesame is reported by the Instituto Nacional de Agricultura. The outbreak (in 1959) was severe, causing burning of the leaves and considerably reducing yields. Selection of tolerant vars. is advocated to control the disease, which was found to be seed-transmitted and was probably introduced from Nicaragua.

Boev (N. D.), Budyuk (V. P.), & Martynov (V. M.). Возделывание масличных культур в Зауралe, Сибири и Казахстане. [The cultivation of oil-yielding crops beyond the Urals and in Siberia and Kazakhstan.]—165 pp., 16 fig., 1 graph, Moscow, Sel'khozgiz, 1959. Roubles 2.25.

In the section 'Pests and diseases of oil-yielding crops and their control' (pp. 151–163) short descriptions are given of fungus diseases with recommendations for their control.

Corbett (M. K.). **Diseases of the Coconut Palm. VI. Yellow mottle decline (cadang-cadang).**—*Principes* (*J. Palm Soc.*), **4**, 2, pp. 40–44, 3 fig., 1960. [8 ref.]

The author summarizes the symptoms of coconut cadang-cadang disease in the Philippines [**39**, 485 *et passim*] in the light of the relevant literature.

Shumilenko (E. P.). Болезни Картофеля и меры борьбы с ними. [Diseases of Potato and measures for their control.]—44 pp., 15 fig., Sverdlovsk, Acad. Sci. U.S.S.R., Urals branch, 1956. Roubles 0.90. [19 ref.]

The main diseases in the Sverdlovsk region are described in some detail with sections on fungi (pp. 4–21), bacteria (pp. 21–26), viruses (pp. 26–30), non-parasitic disorders (pp. 30–32), general control measures (pp. 32–41), and the use of microelements for increasing resistance and yield (pp. 41–42).

Murayama (D.). **Immunological studies on the Potato virus diseases.**—307 pp., 9 pl. (108 fig.), 3 fig., 1 map, Tokyo, Kasai Publishing & Printing Co., 1959. [Jap. Engl. summ. 11 pp., 398 ref.]

This treatise summarizes extensive studies [cf. **39**, 239 *et passim*], chiefly on potato viruses X and Y, including serology, and the distribution and movement of the viruses in the plant.

Nohejl (J.) & Červenka (J.). **Příprava diagnostických sér proti virům X, Y a S u Bramborů imunizací skopců a koně.** [Preparation of diagnostic sera against Potato viruses X, Y, and S by immunization of wether and horse.]—*Ann. Acad. tchécosl. Agric.*, **33**, 2, pp. 169–180, 3 fig., 1960. [Russ., Germ. summ.]

At Potato Res. Inst., Czechoslovak Acad. Sci., Havlíčkův Brod, antigens obtained from tobacco leaves infected by potato virus X and potato leaves infected by potato virus S were injected into a wether and a horse, and a ram, respectively, several

times at varying doses at a few days' interval. The S virus antiserum gave positive reaction on 28, non-specific on 10, and negative on 51 clones of the hybrid 296/51, while of 20 healthy seedlings none reacted positively. A 'bi-valent' XY virus antiserum was acquired from the wether immunized first against X and then against Y viruses. Of 170 tests with this antiserum on Mirka 10 gave positive reactions, compared with 9 by a control XY antiserum acquired from elsewhere, 8 of which were identical in both antisera.

MacKinnon (J. P.) & Munro (J.). **Comparative rates of movement of Potato virus X into tubers and eyes of three Potato varieties.**—*Amer. Potato J.*, **36**, 11, pp. 410–413, 1959.

It is known that potato virus X does not move into all tubers of newly infected plants [cf. **34**, 79; **38**, 25; **39**, 72] and in the authors' experience tubers of certain vars. are less susceptible to field infection than those of others. In these studies at the Bot. and Plant Path. Div., Canada Dept Agric., Ottawa, the virus, inoculated into plants 35 days or less before harvest, invaded more tubers of Keswick than of Canso, and the fewest of Katahdin. The number of tubers not wholly infected increased in all 3 vars. as the time from inoculation to harvest decreased. In partially infected Keswick tubers the virus was found more frequently in eyes from the apex than in those from the stem end or the sides, but in Canso and Katahdin the location of an eye did not influence the likelihood of infection. There was little, if any, movement of the virus in stored tubers.

Kehr (A. E.) & Horton (J. C.). **Resistance of Potato to infection by mechanically introduced virus X.**—*Amer. Potato J.*, **37**, 2, pp. 61–66, 1960.

The potato clones X 927-3 and B 2903-17, developed by U.S. Dept Agric., are known to be susceptible to all commonly occurring strs. of potato virus X [cf. **34**, 313]. However, at Iowa agric. Exp. Sta., Ames, progeny from X 927–3 (female) × B 2903-17 (male) exhibited a resistance seemingly similar to that present in seedling 41956 [**39**, 487]. The genetics of this resistance have to be worked out.

Fernández Valiela (M. V.). **Potato leaf roll virus : a serious trouble in maintaining healthy seed potatoes in Argentina.**—*Amer. Potato J.*, **37**, 3, pp. 90–94, 2 fig., 1960.

During the last 20 yr. more than 100 foreign potato vars. introduced into the main potato-producing regions of Argentina have failed, their yields falling sharply after 2 or 3 multiplications. In Katahdin, for instance, sprouting is poor, growth uneven, the plants poorly developed, the growth and rest periods shortened, and yield considerably depressed. All available data indicate that potato leaf roll virus infection, mostly symptomless, is the main cause of this. When the crop is grown at about 5,400 ft. in the Andean foothills and measures are taken to prevent virus infection, this degeneration does not occur.

Walkinshaw (C. H.) & Larson (R. H.). **Corky ringspot of Potato, a soil-borne virus disease.**—*Res. Bull. Wis. agric. Exp. Sta.* 217, 31 pp., 16 fig., 1959. [37 ref.]

Further work with cultures from Florida [**38**, 764] indicates that potato corky ring spot [spraing] virus [**37**, 501] is composed of 2 viruses, designated necrotic and etching isolates. In Samsun tobacco the necrotic isolate gave water-soaked lesions, which rapidly became necrotic, while systemic movement of the virus resulted in necrosis of veins, petioles, and stems within 10 days: this necrosis extended from the mid-vein to the entire leaf; infected plants seldom recovered, but persisted in a stunted condition until they became senescent. With the etching isolate numerous water-soaked lesions appeared on the lower inoculated leaves after 4 days, while on the upper inoculated leaves there were numerous light brown lesions

tending to form large etched rings. Systemically infected leaves exhibited mild distortion and mottle, while stem necrosis was mild and the plants not appreciably stunted. Affected plants always recovered. The etching culture survived 10 min. at 80° C., while the necrotic isolate was inactivated after 10 min. at 70°.

Reactions of 29 host spp. to inoculation with a mixture of the 2 isolates were similar to reactions to inoculation with tobacco rattle virus [potato stem mottle virus str.: cf. below]; the mixed inoculum had physical properties similar to those of the rattle virus. Virus recovered from potato foliage with mosaic symptoms seemed to consist of the necrotic str. only.

The high percentage of Samsun tobacco plants which became infected on planting out into Florida field soil indicated that the soil could be a source of primary inoculum. A number of solanaceous plants, including young potato plants from true seed, also contracted the infection from the soil. Inoculation of potato roots with expressed sap from Samsun tobacco infected with the mixture of the etching and necrotic isolates was a satisfactory method of reproducing both foliage and tuber symptoms of corky ringspot, but inoculation of the foliage did not give rise to tuber infection. Corky ring spot would appear to be the first soil-borne virus disease of potato encountered in the U.S.A.

CADMAN (C. H.). **Potato stem-mottle disease in Scotland.**—*Europ. Potato J.*, **2**, 3, pp. 165–175, 4 fig., 1959. [Fr., Germ. summ.]

In further studies from the Scot. hort. Res. Inst., Invergowrie [**39**, 221, 261], potato plants affected by stem mottle were found in 3 stocks of Kerr's Pink and 1 of Majestic in E. Scotland, and viruses of the tobacco rattle type [potato stem mottle virus str.] were cultured from haulms of the diseased Kerr's Pink and from necrotic areas in spraing-diseased tubers of this var. from a stock grown in Morayshire. Most of the viruses from the haulms and all those from the tubers multiplied poorly in inoculated tobacco leaves and were difficult to transmit mechanically.

No stem mottle occurred in the progeny of plants of Kerr's Pink, King Edward, Majestic, or Redskin grafted with systemically infected tomato scions, or inoculated with infective tobacco sap. The roots, but not the shoots, of Chancellor and Majestic were rapidly infected when grown in virus-contaminated soil in the greenhouse, and the viruses isolated from them multiplied well in tobacco leaves.

Potato stem mottle and spraing are considered to be closely related [**39**, 240].

MACLACHLAN (D. S.). **Potato spindle tuber in Eastern Canada.**—*Amer. Potato J.*, **37**, 1, pp. 13–17, 1960.

At the Canada Dept Agric., Central exp. Farm, Ottawa, to determine whether spindle tuber [cf. **33**, 685] of E. Canada is of virus origin and to find suitable local lesion or systemic hosts for its identification, plants of seedling 41956 were grafted with scions from plants with spindle tuber symptoms. They did not develop symptoms during the current season and did not give rise to spindle tubers, but plants from the daughter tubers exhibited symptoms of 2 distinct types. In the more common type the general effect was as in purple top (induced by aster yellows virus), except that the upward rolling of the terminal leaves and the accumulation of pigment was not so severe. The 2nd type (in 6 of 17 plants) was a severe spindling and stunting of the plants, with a marked proliferation of the axillary buds, recalling potato witches' broom virus infection. Some of the tubers from both symptom types were spindled. All attempts at mechanical transmission to a number of standard host plants, and by rubbing healthy sets of Kennebec and Sebago against the freshly cut surface of spindled Kennebec tubers, gave negative results. In aphid transmission tests host plants of the same spp. were exposed to 10 viruliferous potato (*Macrosiphum solanifolii*) [*M. euphorbiae*] or green peach [*Myzus persicae*] aphids for 7 days then kept at 18° C. for a max. of 30 days.

Frequently the aphids did not survive the 7 days. No symptoms developed in the test plants.

Tomato plants grafted with scions of seedling 41956 with the purple top type of symptom were clearly stunted after 6 weeks, while the leaves were smaller and rugose and the axillary buds had begun to produce shoots. No symptoms developed on tomato grafted with seedling 41956 exhibiting the witches' broom type of symptom. Similar results were obtained in dodder transmission experiments.

It is probable that all seed sources of the common Canadian potato vars. are infected with spindle tuber virus. As no symptoms attributable to it were observed on the foliage of Kennebec, Sebago, Irish Cobbler, or Green Mountain in the greenhouse and the tubers from plants grown from spindled tubers were usually of normal shape, it is assumed that, as the plants were grown from tubers showing spindle tuber in the field, the virus was present, but masked by the greenhouse conditions. Neither of the symptom types, which occurred in over 90% of stocks of seedling 41956 after grafting with scions from plants showing spindle tuber in the field, resembled the field symptoms. From the grafting and dodder transmission experiments, however, it is clear that the purple top symptoms are attributable to a virus, and it is concluded that a virus of the [aster] yellows type is closely associated with spindle tuber in E. Canada.

Raymer (W. B.) & Milbrath (J. A.). **The identity and host relations of the Potato late-breaking virus.** – *Phytopathology*, **50**, 4, pp. 312-319, 4 fig., 1 graph, 1960. [43 ref.]

Pertinent literature is reviewed in these further studies from Ore. State Coll., Corvallis [cf. **36**, 345], and the identity of this virus with that causing phyllody of Ladino clover [cf. **34**, 807] was confirmed by symptom comparison on 5 hosts; the symptoms and transmission by *Macrosteles fascifrons* indicated that it belonged to the aster yellows virus group, though the exact relationship of the members of this group still needs clarification [cf. above]. It was further transmitted to 15 of 24 plant spp., the reactions of which are described and discussed. In tomato symptoms were typical of aster yellows virus, in *Datura stramonium* they resembled those of tomato big bud virus, and in potato were of the purple-top wilt characteristic of either of these viruses.

Field infection took place chiefly in the 1st half of July and the 2nd half of Aug. The disease was sometimes perpetuated by tubers, but only by a small percentage of those from diseased plants, which, however, always gave rise to hair sprouts [**38**, 371]. Some tubers with normal sprouts also reproduced the disease. Incidence of the disease was in direct proportion to the quantity of Ladino clover in any area.

Sharma (B. B.) & Saxena (B. N.). **A suspected virus disease of Potato.**—*Rev. Mycol., Paris*, **24**, 4, pp. 365–367, 1959.

Phulwa potatoes growing near Lucknow in Feb. 1956 developed malformed shoots, purplish aerial tubers in leaf axils, chlorosis and marginal in-rolling of the leaves, and undersized tubers on underground shoots. Farmers suffered serious financial loss. No fungi or bacteria were associated with the condition, which appeared to resemble that caused by aster yellows virus [map 56], not hitherto recorded from India on any host.

Bojňanský (V.) & Kosljarová (Mme V.). **Vplyv stolburu na úrodu Zemiakov.** [The effect of stolbur on Potato yield.] — *Ann. Acad. tchécosl. Agric., 1959*, 5, pp. 125–140, 1959. [Russ., Germ., Engl. summ. Abs. in *Referat. Zh. Biol., 1960*, 2, p. 188, 1960.]

From experiments over a long period and published records the authors assess the

harm resulting from [tomato] stolbur virus [**38**, 135] in potato. In warmer parts of Czechoslovakia, especially in S. Slovakia and S. Moravia, 15–20% infection can be seen on the haulms in the autumn. In spring some tubers fail to germinate, others (20–35%) have hair sprouts [**38**, 333]. There is an av. reduction in starch content in infected tubers of 2·2%, and an 0·2% reduction (wet wt.) of proteins. Losses are 2–3 times higher in hot, dry weather.

Hansen (H. P.). **Tobacco mosaic virus carried in Potato tubers.** -*Amer. Potato J.*, **37**, 3, pp. 95–101, 6 fig., 1960.

An abstract of this paper has been noticed [**39**, 240].

Cox (A. E.) & Large (E. C.). **Potato blight epidemics throughout the world.**—*Agric. Handb. U.S. Dep. Agric.* 174, iv+230 pp., 141 graphs, 61 maps, 1960. [325 ref.]

The work for this comprehensive review was done at the Plant Path. Lab., Harpenden, England, in collaboration with the U.S. Dept Agric. and many workers. It contains much hitherto unpublished information. An introductory section on potatoes and blight (*Phytophthora infestans*) in general is followed by others devoted to blight epidemics, losses, forecasting, and control in each country in the main potato-growing areas of the world. Relevant facts concerning potato cultivation in each are given, followed by an account of cropping periods in relation to important climatic features (illustrated by useful 'climagrams'), data concerning epidemics and losses, and an outline of control measures, each section concluding with a summary of the main findings. In the final chapt. a number of factors common to blight epidemics throughout the world are discussed. The importance of the compensatory effect on yield from the more abundant rainfall in blight years is stressed. The chapt. ends with 18 points on which further information is required, including the establishment of the extent of 'true losses' in many areas; the potentialities of 'disease escape' and breeding for this; the importance of 'field resistance' and the 'improvement' of good popular vars.; effect of heat treatment on blight in tubers; improvement of rain resistance of fungicides, the testing of Cu fungicides on the soil, and the economics of control programmes; and epidemiology.

Hyre (R. A.), Bonde (R.), & Manzer (F. E.). **Reevaluation in Maine of three methods proposed for forecasting late blight of Potato.**—*Plant Dis. Reptr*, **44**, 4, pp. 235–237, 1 graph, 1960.

The methods investigated in 1958 [cf. **38**, 618] were used by U.S. Dept Agric., Newark, Del., and Maine agric. Exp. Sta., Orono, to forecast incidence of *Phytophthora infestans* on potato in Aroostock County in 1959. The 'moving-graph' method based on rainfall and temp. data would have sufficed for this purpose, the 90% R.H. method would have been somewhat less accurate, whereas the determination of Beaumont periods (75% R.H.) gave an unreliable forecast.

Wallin (J. R.) & Riley (J. A.). **Weather map analysis—an aid in forecasting Potato late blight.**—*Plant Dis. Reptr*, **44**, 4, pp. 227–234, 1 diag., 1 graph, 14 maps, 1960. [16 ref.]

In further studies [cf. **38**, 26] by U.S. Dept Agric., Ames, and U.S. Dept Commerce, Des Moines, Iowa, 30-day prognostic weather maps for July, Aug., and Sept. showed a relation between the incidence of *Phytophthora infestans* [cf. above] on potato and tomato and relatively strong SE., E., and NE. winds usually accompanied by above normal humidity and rainfall, and should prove a useful aid in forecasting blight [**39**, 187].

Pejml (K.). **Příspěvek k předpovědi fytoftory (Phytophthora infestans, Montagne, de Bary) podle minimální teploty a relativní vlhkosti vzduchu, pozorovaných na**

meteorologických stanicích. [Contribution to the forecasting of *P. infestans* according to minimal temperature and relative humidity of air observed in the meteorological stations.]—*Ann. Acad. tchécosl. Agric.*, **33**, 2, pp. 181–194, 1 fig., 7 graphs, 1960. [Russ., Germ. summ.]

Temperature and humidity measurements [cf. **39**, 188] at the Agrometeorological Observatory, Doksany, Czechoslovakia, in screens in the open (2 m. above the ground) and in a potato stand (0·2 m.) suggested complex relations between the respective values for R.H., which varied during the 3 examined growth phases of the stand. The closing of the stand caused important changes in the effect of different meteorological factors. Winds of 1·5 and 2·5 Beaufort had no effects on the R.H. in the open and in the stands, respectively.

Schick (R.) & Schick (E.). **Die Differenzierung der verschiedenen Rassen der Phytophthora infestans auf Sämlingen von S. demissum (Lindl.) und S. stoloniferum (Schlecht. et Bouché).** [The differentiation of various races of *P. infestans* on seedlings of *Solanum demissum* and *S. stoloniferum*.]—*Züchter*, **29**, 5, pp. 220–225, 2 graphs, 1959.

In further work [**37**, 503] at the Inst. für Pflanzenzüchtung Gross-Lüsewitz, Berlin, the test series formerly used for the differentiation of races of *P. infestans*, *viz.* Flava (r), Aquila (R_1), Lindenhof 1763 (R_3), Virginia (R_1R_4), Krasnoufinskij (R_2R_4), and the breeding strains 1512 C (R_2) and 1563 C (R_4) from Black [**33**, 250], proved unsatisfactory owing to increasing virus infection: since 1954 a new test series has been built up, mostly by selection of the progeny from selfing Reddick's homozygous lines of *S. demissum* [**33**, 176], viz. RPI 14224 a, RPI 14215, PI 160 227, Orgeo IV 14, and Volkenrode 1951. A seedling of *S. stoloniferum* is also included. A table gives the descent of the differentials now in use, in so far as the R gene is concerned.

The races used in the tests were O, B, U, A, G, E, D, L, N5, V, P, H, F, N9, R, M, and N8. The results obtained have been entirely satisfactory and more reliable than those with clones which could be protected only with great difficulty from virus infection.

Haussdörfer (M.). **Untersuchungen über die Entwicklung des Befalls mit den verschiedenen physiologischen Rassen der Phytophthora infestans bei einigen mittelfrühen und mittelspäten Kartoffelsorten im Jahre 1958.** [Investigations on the development of infection by various physiologic races of *P. infestans* on mid-early and mid-late Potato vars. in 1958.] *Züchter*, **29**, 5, pp. 237–239, 5 graphs, 1959.

A study, at the Inst. für Pflanzenzüchtung Gross-Lüsewitz, Berlin, of 591 isolates of *P. infestans* [cf. above], received in 1958 from various parts of Germany, gave no evidence for a regional specialization of individual races. In almost all regions races 4, 1, and 0 were present along with the more specialized races. On the mid-early var. Bona race 4 is the first to appear, followed by race 1,4 and then race 1. Bona and the mid-early var. Meise were attacked 10 days earlier than the mid-late vars. Nova and Aquila.

In breeding resistant earlies special attention should be given to the resistance factor R_1.

Van der Zaag (D. E.). **Some observations on breeding for resistance to Phytophthora infestans.**—*Europ. Potato J.*, **2**, 4, pp. 278–286, 1959. [Germ., Fr. summ.]

In this paper [cf. **36**, 118] from the Res. and Advisory Inst. for Field Crop and Grassland Husbandry, Wageningen, Netherlands, the author broaches the question of the degree of blight resistance necessary. As epidemics originate and develop mainly in highly susceptible vars., he assumes that if in any region only those

vars. having a resistance rating of 7 or more were to be grown, blight would present no problem. Breeders should therefore aim to replace the very susceptible vars. with others possessing such resistance. There is, however, an association between early maturity and low field resistance [cf. **37**, 735], which hinders the combination of earliness with reasonable leaf resistance. It was determined in preliminary experiments that field resistance of the foliage of normal potato vars. is resolvable into 3 components, chance of infection, rate of mycelial growth [**39**, 491], and rate and degree of sporulation, varying widely and to all appearance independently. Further studies of these factors should enable breeders to choose suitable parent vars.

Kedar (N.). **The peroxidase test as a tool in the selection of Potato vars. resistant to late blight.**—*Amer. Potato J.*, **36**, 9, pp. 315–324, 1959.

At the Dept of Field and Vegetable Crops, Fac. Agric., Hebrew Univ., Jerusalem, Israel, a positive correlation was found between peroxidase activity (P.A.) in the crude sap of healthy potato foliage and the degree of resistance to *Phytophthora infestans* [cf. **31**, 78] in plants with field resistance determined by minor (rr) genes [cf. **33**, 47; **39**, 339 and above]. Vars. with high resistance based on the R_1 gene had high, medium, or low P.A., but a relationship between P.A. and the resistance provided by rr genes in such plants was demonstrable once the 'masking' effect of the R_1 gene had been overcome by inoculation with the compatible race 1,4. The P.A. test may prove reliable as an additional tool in the selection of vars. incorporating R_1 or possibly other R genes reinforced by minor genes determining a high degree of field resistance.

Sokolova (Mme V. E.), Savel'eva (Mme O. N.), & Solov'eva (Mme G. A.) О токсичности хлорогеновой кислоты по отношению к грибу **Phytophthora infestans.** [On the toxicity of chlorogenic acid in relation to the fungus *P. infestans*.]—*C.R. Acad. Sci. U.R.S.S.*, **131**, 4, pp. 968–971, 1960.

In further work [**39**, 340] at A.N. Bach Inst. Biochem., Acad. Sci. U.S.S.R., the addition of chlorogenic acid at 1 and 2 mg./ml. to an oatmeal agar medium had no toxic effect on *P. infestans*, and even tended to stimulate growth. The defence action of chlorogenic acid in resistant potato plants [loc. cit.] is thought to be due not to its direct toxicity but rather to substances produced under the influence of the host polyphenoloxidase, possibly caffeic and quinic acids or their derivatives.

Yurova (Mme N. F.). О перезимовке фитофторы Картофеля и Томатов. [Overwintering of *Phytophthora* of Potatoes and Tomatoes.]—Защ. Раст., Москва [*Zashch. Rast., Moskva*], **5**, 2, pp. 29–31, 3 fig., 1960.

In experiments in the N.W. zone of the European U.S.S.R., oospores of *Phytophthora infestans* [**39**, 48, 188] were shown to survive in infected plant remains, including tomato fruit. Soil is the main source of infection, and the fungus can persist for several years without living plants. Crop rotation is an important factor in control.

Robinson (D. B.), Easton (G. D.), & Larson (R. H.). **Some common stem streaks of Potato.**—*Amer. Potato J.*, **37**, 2, pp. 67–72, 6 fig., 1960.

Some characteristics noted at the Res. Lab., Canada Dept Agric., Charlottetown, Prince Edward I., Univ. Wis., and U.S. Dept Agric., that differentiate streak symptoms caused by blight (*Phytophthora infestans*), *Verticillium alboatrum*, Mn toxicity, and potato virus Y are given.

In a greenhouse experiment to examine the possible correlation between *Verticillium* streak [cf. **37**, 370] and Mn toxicity streak [cf. **35**, 389], young Irish Cobbler plants, inoculated with *V. alboatrum* and uninoculated, were planted in

completely fertilized sandy loam soil adjusted to a low or a high level of Mn by addition of calcitic lime and $MnSO_4$, respectively. Both wilt and streak began to appear in 4 weeks in some of the inoculated plants and increased steadily in severity. As the Mn application was not sufficient to cause Mn streak in the uninoculated plants, the streak symptoms which developed were classed as *Verticillium* streak. At 48 days there was still no wilt or streak in the uninoculated plants, but the inoculated, under conditions of high Mn nutrition, showed both streak and wilt, and wilt only at the low Mn level: within the inoculated series low moisture discouraged the appearance of both streak and wilt symptoms. This effect of Mn in increasing the apparent severity of *Verticillium* infection may explain some hitherto inexplicable outbreaks of *Verticillium* streak in the field.

Blattný (C.). **Doplněk k práci J. Zakopala a B. Spitzové : Příspěvek k otázce ras či biotypů (formae speciales) rakoviny Bramborů Synchytrium endobioticum (Schilb.) Perc. v Československu.** [Supplement to the work of J. Zakopal and B. Spitzová: Contribution to the question of races or biotypes (f. sp.) of Potato wart *S. endobioticum* in Czechoslovakia.]—*Ann. Acad. tchécosl. Agric.*, **33**, 2, pp. 277–280, 1960. [Russ., Germ. summ.]

Some information supplementary to the quoted study (*Ann. Acad. tchécosl. Agric.*, **31**, pp. 999–1018, 1958) [cf. **38**, 273] is given. The field in Šluknov, N. Bohemia, from which the biotype NB had been isolated, was deliberately infested in 1945–6 with warts of the biotype (SB) from a S. Bohemian experimental field, identical with the Carpathian biotype, a fact which accounts for the existence of a single biotype in Czechoslovakia nowadays [**39**, 488]. Differences in varietal reactions indicate that neither SB nor the late NB biotype is identical with the German Dahlem or any other biotype outside Czechoslovakia.

Guthrie (J. W.). **The influence of seed-piece treatment on disease control and yield of Russet Burbank Potatoes.**—*Amer. Potato J.*, **36**, 9, pp. 309–314, 1959.

In Idaho many growers have abandoned the chemical treatment of seed pieces on account of poor results, which have, however, been mainly attributable to faulty technique or the use of inadequately tested materials. At the Univ. Idaho agric. Exp. Sta., Moscow, seed pieces were dipped in solutions of semesan bel (648 g./10 gal.), captan 75 (181 g.), terraclor (453), and phygon XL (453), each with or without agrimycin (26), and agrimycin alone 1 or 10 days before planting in dry or irrigated soil. Infection by *Rhizoctonia* [*Corticium*] *solani* was least with semesan bel alone or +agrimycin, or with terraclor, in dry soil. Seed piece decay was reduced by all treatments except agrimycin, terraclor, and a mixture of the 2, regardless of holding period and soil conditions [cf. **34**, 745; **39**, 79].

Semesan bel, alone and +agrimycin, and captan 75 gave the best control. Only semesan bel +agrimycin appreciably increased yield when planting was delayed for 10 days following treatment. This combination is recommended for Idaho.

Bazán de Segura (C[onsuelo]). **The gangrena disease of Potato in Peru.**—*Plant Dis. Reptr*, **44**, 4, p. 257, 1960.

This disease, caused by *Thecaphora solani* [**35**, 917] and previously thought to be confined to the Andes, occurred in several more low lying localities, particularly on the Peruanita var., which suffered losses up to more than 80%. It is tuber-transmitted and favoured by high humidity and saline soils.

Verleur (J. D.). **Studies on the increased respiration of Potato tuber tissue after infection with Gibberella saubinettii (Mont.) Sacc.**—*Acta bot. neerl.*, **9**, 2, pp. 119–166, 2 fig., 14 graphs, 1960.

At the bot. Lab., Free Univ., Amsterdam, potato tubers (var. Bintje) were cut in

half, one half being inoculated at the cut surface with *G. saubinetii* [*G. zeae*], and both halves incubated at 25° C. As the fungus invaded only the surface 2–3 mm., by taking tissue plugs vertically from the cut surface and sectioning them, it was possible to compare invaded and adjacent non-invaded tissue. Respiration was distinctly accelerated in the proximity of the invaded area [cf. **37**, 418] and decreased with increasing distance from that area, to a nearly constant level. Occasionally there was a soft zone, close below the invaded area, and here the O uptake was lower than in the adjacent, apparently normal, tissue. In the non-infected halves there was increased respiration (max. at 24 hr.) up to 2–3 mm. below the surface of the cut [cf. **39**, 340], which was blocked by a cork layer, whereas there was no cambial activity in the infected. Experiments with a malonate inhibitor suggested the possibility of a change in metabolic pathway in the apparently normal uninvaded tissue, after continued influence of the infection.

Lewis (B. G.) & Nicholson (T. H.). **Studies on common scab of Potato.**—*Rep. Sch. Agric. Nottingham, 1959*, pp. 53–56, 2 fig., 1960.

Estimations in June and Aug. of the microflora on the surface of Ulster Chieftain, King Edward, and Seneca tubers (increasingly resistant to scab (*Streptomyces scabies*) in this order) in naturally infested soils showed actinomycetes to decrease and bacteria to increase with resistance, the degree of which is correlated in the number of actinomycetes near the tuber. There were fewer micro-organisms on older tubers, though actinomycetes decreased and bacteria and fungi increased at the 2nd harvest. Inoculation of Ulster Chieftain tubers in damp chambers with *S. scabies* spores at specific times demonstrated that the area of affected tissue at harvest is proportional to the amount of tuber growth since inoculation. Thus no lesions occurred on the tubers which had finished growing before inoculation and had a thick periderm. Varietal responses to this technique are being studied.

Erickson (H. T.). **Potato scab control on organic soils. I. Initial response to PCNB.**—*Amer. Potato J.*, **37**, 1, pp. 18–22, 1960.

At Purdue Univ. agric. Exp. Sta., Ind., the incidence of scab (*Streptomyces scabies*) in a muck soil of high exchange capacity was significantly reduced by applications of 20% pentachloronitrobenzene (PCNB) dust [cf. **39**, 36] at rates up to 300 lb. active ingredient/acre. There was no reduction in tuber yields. At the higher rates there was residual activity in the following year [cf. **36**, 662]. Repeat treatment in the 2nd year gave a further significant decline in scab, and for muck soils a moderate dosing each year would appear to be the most efficient procedure, but potatoes are not normally grown on the same muck soil in successive seasons and economic considerations must govern the use of PCNB.

Forsøg med bekaempelse av Kartoffelskurv. [Experiments on the control of Potato scab.]—*Medd. Forsøksv. Plantek. Kbh.* 640, 4 pp., 1 fig., 1960.

Experiments in Denmark from 1956–59 demonstrated the efficiency of soil treatment with brassicol-super (100 kg./ha.) against *Streptomyces scabies*. Although complete elimination was not achieved, most of the tubers from treated plots were assigned to grades 0–2 (little or no infection) while others were of saleable quality. A mixture of brassicol-super and $(NH_4)_2SO_4$ (600 kg.) was also very effective. The incidence of *Rhizoctonia* [*Corticium*] *solani* was also reduced by brassicol.

Hellmers (E.). **Pectobacterium carotovorum var. atrosepticum (van Hall) Dowson the correct name of the Potato black leg pathogen; a historical and critical review.** *–Europ. Potato J.*, **2**, 4, pp. 251–271, 1959. [Germ., Fr. summ. 58 ref.]

The author (Kgl. Veterinäer og Landbohøjskole, plantepatologisk Afdeling, Copenhagen) reviews the literature for 1878–1958 on potato black leg and soft

rot [cf. **32**, 448]. In conclusion he refers the causative bacteria to *Pectobacterium* [**32**, 12]. All pertinent bacteria described over the period of the review are united in a single sp., *P. carotovorum* [*Erwinia carotovora*], within which the 'atrosepticus' isolates, identifiable by serological tests, temp. relations, and their failure to oxidize ethanol, are regarded as *P. carotovorum* var. *atrosepticum*.

O'Keefe (R. B.) & Werner (H. O.). **Apparent eradication of bacterial ring rot from seed stocks of a Potato breeding program.**—*Amer. Potato J.*, **36**, 12, pp. 427–433, 1959.

As an outbreak of *Corynebacterium sepedonicum* in breeding material at the Box Butte exp. Farm, Univ. Nebraska, in 1953 could not be dealt with by disposal of all stocks, a rigorous sanitary programme (including the use of $CuSO_4$ and formaldehyde as disinfectants) was introduced and only plants selected for their healthy appearance and indexed by preparing Gram smears from the stems [**24**, 246] and by examining tuber sections for fluorescence under UV light [**24**, 30] were propagated. No infected plants or tubers have been seen since 1955.

Beraha (L.), Ramsey (G. B.), Smith (M. A.), & Wright (W. R.). **Effects of gamma radiation on some important Potato tuber decays.**—*Amer. Potato J.*, **36**, 9, pp. 333–338, 8 fig., 1959.

In further studies of possible applications of this technique [cf. **38**, 704; **39**, 438 and below] gamma radiation at 17,700–477,400 rads did not prevent decay in Red Pontiac tubers previously inoculated with *E. carotovora* [**39**, 343], while higher dosage caused extensive discoloration and softening. Against *Phytophthora infestans* 45,640 r. prevented tuber decay without injury, while growth of 24-hr. plate cultures ceased after 22,820 r., the lowest dose tested. The 456,400 r. treatment failed to control rotting by *Fusarium* spp. occurring naturally on the tuber surface.

In tubers inoculated with *Pythium debaryanum* doses of 137,000 and 157,000 r., applied at 3,000 r. min., were ineffective but 7,000/min. gave almost complete control.

Since a slight softening of the tubers occurred at 137,000 r., however, the treatment would not be practical.

Mukhin (E. N.). Активность окислительно-восстановительных ферментов и устойчивость Картофеля к функциональным заболеваниям в связи с действием гамма-излучения. [Redox enzyme activity and resistance of Potato to functional diseases in connexion with the effect of gamma-radiation.]—*C.R. Acad. Sci. U.R.S.S.*, **131**, 5, pp. 1177–1180, 2 graphs, 1960.

In further work [**39**, 189] at the A.N. Bach Inst. Biochem., on the use of γ-radiation (Co^{60}) for prolonging storage, tubers susceptible to internal darkening, common in several vars. in some years, were subjected to 10,000 r. and were considerably more resistant. In 1956 irradiated tubers of Épron, Lorkh, and Peredovik were completely resistant to functional disorders, as against 11, 14, and 30% affected in the untreated. In the experimental reproduction of the disorder in Lorkh and Épron, in anaerobic conditions as well as in prolonged storage of irradiated tubers, the darkened tissue was characterized by high peroxidase activity and polyphenoloxidase inactivation. Dehydrase activity is retained to varying degrees in different vars. Results confirm the important role played by decompensation between the oxidizing and reducing processes in the development of the disorder. Decompensation, however, is not the only factor responsible for darkening of the tuber tissue.

Jacob (W. C.). **Studies on internal black spot of Potatoes.**—*Mem. Cornell agric. Exp. Sta.* 368, 86 pp., 2 fig., 39 graphs, 1959.

Internal black spot [cf. **38**, 541 and below] has been serious on Long Island since 1939. The results of approx. 65 experiments conducted by the Vegetable Crops

Dept, Cornell Univ., since 1940 are summarized. K was the most important of the mineral elements studied, potash at the uneconomic level of 600 lb./acre giving commercial control. These are significant differences in susceptibility between vars., and cultivation of appropriate vars. is thought to be the most hopeful line of approach. Bruising is the most important single factor in determining incidence. When the influencing factor in the occurrence of the disease is var., or date of planting, or location, then high tyrosine levels are found to be associated with low incidence. Storage at 40° F. gives the best results. A 2 day exposure to 70° tends to prevent blackening from subsequent bruising.

Sawyer (R. L.) & Collin (G. H.). **Black spot of Potatoes.** —*Amer. Potato J.*, **37**, 4, pp. 115–126, 3 fig., 1 graph, 1960. [15 ref.]

At the Vegetable Crops Dept, Cornell Univ., black spot [cf. above] was produced artificially in tissue disks from the vascular region of tubers when they were bruised by a 20 g. weight dropped 10 cm. through a vertical cylinder. The turgor of the tissue was previously adjusted over a range of values by bathing the disks for 30 min. in an aqueous mannitol solution of appropriate conc. Regardless of the age or var. of the tubers, only those disks exposed to 0·8 M or greater developed colour after bruising: thus, disks from long-stored and highly susceptible Katahdin tubers developed no colour when they had been bathed in distilled water, while, by contrast, those from non-susceptible vars. developed marked colour when bruised after bathing in 0·8 M mannitol. Factors, such as increased ventilation, causing an increase of moisture loss from stored tubers, also caused an increase in black spot. The use of moister air for ventilation was found to lower the incidence of black spot. Differences in varietal susceptibility appear to be linked with lenticel and periderm structure. The evidence indicates that tuber firmness is a physical factor important to the chemical reaction producing black spot.

Wolcott (A. R.) & Ellis (N. K.). **Internal browning of Potato tubers : varietal susceptibility as related to weather and cultural practices.**—*Amer. Potato J.*, **36**, 11, pp. 394–403, 7 graphs, 1959.

In further studies at Purdue Univ. agric. Exp. Sta., Lafayette, Ind. [cf. **35**, 389; **36**, 421], internal browning in 20 standard potato vars. and seedling lines was found to be more severe in 1954, when an artificially high water table (18–24 in.) was maintained, than in 1953 under drought conditions. Necrotic symptoms were first observed during or just after periods of rising temp., or during an improved moisture situation following low temp. or drought.

The distribution of internal brown spot, heart necrosis, corky ringspot or sprain [spraing], and canker type internal rust spot [**36**, 551] among vars. and among plantings made on different dates supports the view that these different patterns of necrosis have some common physiological origin, but vary in form and severity according to the stage of development of the tuber tissues at the time of injury.

Ahmadi (A. A.), Mobarak (H.), & Osguthorpe (J.). **The effect of time of planting on occurrence of internal brown spot in the Potato var. Arran Banner in Lebanon.**—*Amer. Potato J.*, **37**, 1, pp. 23–27, 1 fig., 1 graph, 1960.

At the Univ. exp. Farm, American Univ., Beirut, Lebanon, experiments in 1957 and 1958 indicated that the intensity of internal brown spot [cf. above] in harvested tubers was less when planting was delayed. The incidence was 78% from Feb. plantings, and as little as 1% for June plantings. While yields were lower with the delayed plantings, the June ones gave good tubers which kept well in storage for 4 months. By contrast the early plantings gave small inferior tubers, many of which sprouted while still in the ground (cf. Ellison *et al.*, *Amer. Potato J.*, **29**, pp. 241–252, 1952).

EDGAR (A. T.). **Manual of Rubber planting (Malaya) 1958.** x+705 pp., illus., Kuala Lumpur, The Incorporated Society of Planters, 1960. 63*s*.

This is the 2nd edition of a standard reference work first published in 1937. The book, designed for speedy reference, has been considerably enlarged and is intended to be as complete a manual as possible on normal estate routine. One chapt. (pp. 226–287) deals with pests and diseases [cf. **38**, 711], their symptoms, spread, and control; it contains a section on nutritional deficiencies and another on sprays and poisonous mixtures.

ROSSETTI (VICTORIA). **Doenças da Seringueira.** [Diseases of Rubber.]—*Biológico*, **25**, 11, pp. 233–243, 8 fig.; 12, pp. 266–272, 2 fig., 1959.

Information is presented on the geographical distribution, etiology, symptoms, and control of the diseases [cf. **26**, 417] caused by *Dothidella ulei*, *Oidium heveae* [**38**, 421], *Phytophthora palmivora* and other *P.* spp., *Elsinoe heveae*, *Pellicularia filamentosa*, *Periconia manihoticola* [cf. **25**, 9], *Catacauma* [*Phyllachora*] *huberi*, *Glomerella cingulata*, *Helminthosporium heveae*, *Cephaleuros mycoidea*, *Corticium salmonicolor*, *Diplodia* and *Phoma* spp., *Fomes lignosus*, *F. noxius*, *Ganoderma pseudoferreum*, *Ustulina zonata*, and *Ceratostomella* [*Ceratocystis*] *fimbriata*. Some of these fungi, though present in other parts of Brazil, have not yet been introduced into São Paulo; a rigorous quarantine is imposed by the Biological Institute to prevent the entry, e.g., of *D. ulei*. Investigations are in progress on the cause of a conspicuous black spotting of the leaves which occurs in some districts of São Paulo; the small, angular lesions, generally encircled by a bright yellow halo, are often delimited by the secondary veins.

D'EMMEREZ DE CHARMOY (D.). **Les ennemis d'origine végétale de la Canne à sucre à la Réunion.** [The enemies of plant origin of Sugarcane in Réunion.]—*Rev. agric. Réunion*, N.S., **60**, pp. 12–16, 1960.

In this short account of the diseases of sugarcane in Réunion, most of which have been noted [cf. **38**, 625] or are of world wide occurrence, chlorotic streak virus disease [map 29; cf. **38**, 625] is included. Pokkah boeng (*Gibberella fujikuroi* var. *subglutinans*), which occurs occasionally in wet weather and has been present for nearly 25 yr., is distinguished from the disease formerly referred to as 'apoplexy' and attributed to *Cephalosporium sacchari* [**26**, 564; **33**, 381].

Twenty-third Annual Report of the British West Indies Central Sugar Cane Breeding Station, Barbados, for the year ended September 30th, 1956. 52 pp. [? 1960].

In this report [cf. **39**, 191] is noted the apparent association of resistance to sugarcane mosaic virus with chromosomes from the 112-chromosome *Saccharum spontaneum* of Java and from *S. sinense*, but not from *S. officinarum* (the noble canes), the 64-chromosome *S. spontaneum* of India, or *S. robustum*. Unfortunately, as many vars. resistant to mosaic are susceptible to chlorotic streak (e.g. B 37172 and B 4362) [cf. **36**, 499] resistance to the latter must be sought elsewhere.

In breeding trials for resistance to leaf scald [*Xanthomonas albilineans*) [cf. **38**, 657] the behaviour of certain vars. indicates that the Caribbean str. of the pathogen differs from that in the eastern hemisphere. All forms of *S. spontaneum* and several 1st and 2nd nobilisations in the *spontaneum* series are resistant, but *S. robustum* forms are highly susceptible. Vars. of *S. officinarum* vary in resistance, and *S. sinense* forms, probably derived from *officinarum-spontaneum* hybrids, are tolerant or susceptible-tolerant.

SMITH (C. E. M.) & MANSER (P. D.). **Recent work on ratoon stunting disease in Jamaica.**—*J.A.S.T. Journal*, **21**, pp. 25–29, 2 graphs, 1959.

Ratoon stunting [virus] disease [cf. **36**, 499] was confirmed on 8 commercial

sugarcane vars. in Jamaica in 1953. Subsequent inoculations with diseased juice decreased yields by a mean of 9·68% in 23 vars. tested and caused 184% increase in the incidence of symptoms. In Co. 421 symptom intensity and disease effects were highly correlated. Disease reduction after hot water treatment at 52° C. for 1 or 1½ hr. [cf. **39**, 498] was effective up to the 3rd ratoon crop, but was not consistent in all vars. and in 3 vars. yield was depressed. Visual examination of nodal symptoms was not sufficient for obtaining disease-free planting material.

Fife (J. M.) & Stokes (I. E.). **Amino acid changes identify ratoon stunting disease. Preliminary chromatographic studies.**—*Sugar y Azucar*, **54**, 11, pp. 27–28, 1 fig., 1959.

At the Crops Res. Div., U.S. Dept Agric., Beltsville, Md, the conc. of aspartic and glutamic acids, serine, glycine, threonine, citrulline, and at least 1 unidentified amino acid was shown to be higher in the leaves of Co. 285 and F. 31–962 sugarcane infected by ratoon stunting virus than in healthy ones. The changes were particularly marked in leaves 1, 2, and 3 (numbered from the top leaf auricle downwards) in which the mean amino acid increases in infected over healthy foliage were estimated at 51·2 and 58·8% in 2 tests.

Recommendations for the control of mosaic disease of Sugarcane in Louisiana for 1960.—*Sug. Bull., N. Orleans*, **38**, 12, pp. 157–158, 1960.

Prepared jointly by pathologists of the La Agric. Exp. Sta. and the U.S. Dept Agric., Sugarcane Field Sta., Houma, the recommendations include the spraying of infected plant canes (where the incidence does not exceed 2%) with garlon (1 gal./4 gal. diesel fuel) and their subsequent destruction, and the use on heavily infested properties of mosaic-free 'seed' of vars. C.P. 44–101 and C.P. 52–68.

Ahmed (J.). **Preliminary study on varietal resistance of standing Cane to Pineapple disease and the influence of the disease on the juice quality.**—*Madras agric. J.*, **47**, 1, pp. 8–15, 1960.

Of the sugarcane vars. Co. 419, Co. 449, Co. 527, Co. 658, and Co. 1001 inoculated at 7 months with *Ceratostomella* [*Ceratocystis*] *paradoxa* [**37**, 418] by the standard plug method at the Central Sugarcane Res. Sta., Cuddalore N.T., Co. 658 was the least susceptible. The fungus reacted in a similar manner in all the vars., the upward spread of infection being greater than the downward. It caused reduction in the C.C.S. % of all vars., but the deterioration in juice quality of Co. 658 and Co. 527 was not significant.

Srinivasan (K. V.) & Vijayalakshmi (U.). **Thiamine and biotin requirements of two strains of Glomerella tucumanensis (Speg.) Arx and Mueller.**—*Curr. Sci.*, **29**, 3, pp. 103–104, 1960.

Strs. 244 and D of *G. tucumanensis* [cf. **39**, 192] at the Sugarcane Breeding Inst., Coimbatore, India, failed to grow on sucrose-nitrate medium with subsequent additions of the micro-nutrients Fe, Zn, Mn, and Cu. Supplements of thiamine, biotin, pyridoxine, and inositol revealed dependence on thiamine, which increased the mycelial wt. and stimulated sporulation at 50–200 μg. (though markedly suppressing it at 500 μg.), and on biotin which progressively increased both mycelial wt. and sporulation up to 5 μg./ml.

D'Emmerez de Charmoy (D.). **Au sujet d'une récente réapparition de gommose à la Réunion.** [On a recent reappearance of gumming disease in Réunion.]—*Rev. agric. Réunion*, N.S., **59**, pp. 287–294, 1959.

Exudations of gum from the stem of M-134/32 sugarcane, previously considered to be highly resistant to gumming disease [*Xanthomonas vasculorum*], have been

noted [cf. **38**, 625] despite the absence of symptoms on the leaves. In other vars. exudation of gum is not invariably present and reddening of the vascular bundles has not been observed locally. The disease is spreading rapidly through the island, the drier areas being most affected. The available evidence shows it to be endemic and to break out periodically. The selection of cuttings is not sufficiently careful. R-397 is highly susceptible, M-134 32, Ebene 1 37, Vesta, R-445, R-447/476, and B-41/227 have been considered resistant.

In addition to the apparent change in the degree of susceptibility to the disease of certain vars. an intense chlorosis has recently appeared on M-147/47 and N Co. 310. Either the causal organism has become more virulent or a new str. has been introduced. The author considers that the chlorosis is an attribute of the cane, which appears to be specific for R.R.A. 106, R-460, M-147/44, and N Co. 310, rather than being due to the bacterium.

KINCAID (R. R.). **Crop rotation and fallowing in relation to Tobacco disease control.** —*Bot. Rev.*, **26**, 2, pp. 261–276, 1960. [75 ref.]

The author (N. Fla Exp. Sta., Quincy, Fla) briefly reviews and discusses the information available in relation to black shank (*Phytophthora parasitica* var. *nicotianae*) [cf. **23**, 460; **36**, 790], black root rot (*Thielaviopsis basicola*), wilt due to *Fusarium oxysporum* var. *nicotianae* [cf. **23**, 460], stem rot (*Sclerotium rolfsii*) [loc. cit.], *Sclerotinia* disease (*S. sclerotiorum*) [cf. **36**, 619], brown spot (*Alternaria longipes*) [loc. cit.], bacterial wilt (*Pseudomonas solanacearum*) [cf. **23**, 460], wildfire (*P. tabacum*), angular leaf spot (*P. angulata*), and mosaic virus.

BRUYNS-HAYLETT (J. P.). **The influence of mosaic-infected Tobacco crop residues in the soil on the incidence of primary mosaic in the subsequent Tobacco crop.**— *S. Afr. J. Sci.*, **2**, 3, pp. 331–341, 1959. [Afrikaans, Fr. summ.]

At the Central Tobacco Res. Sta., Rustenburg, plots 78×12 ft. were either left fallow or planted (80, 208, or 624 plants plot) with tobacco which was inoculated with tobacco mosaic virus [**39**, 348] when 1 ft. high. At flowering these plants were pulled up from 1 series of plots, and buried 9 in. deep in 2nd series, and ploughed in as they stood in a 3rd. After 2 months all plots were then sown with Punjab wheat, with standard fertilization, and after harvest planted again with tobacco.

There was little difference in incidence of mosaic in the 3 plots, though primary mosaic was slightly higher in those containing infected material (av. 4·3% for ploughing in, 4·6% for burying, 3·9% plants pulled out); the low incidence suggests that transmission of the disease via the roots in contaminated soil is of minor importance and that pulling up and removal of diseased crop residues instead of ploughing in is unneccessary.

AACH (H. G.). **Zur Konstanz der Aminosäurenzusammensetzung im Eiweissanteil des Tabak-Mosaic-Virus. I. Der Einfluss erhöhter Temperatur.** [On the constancy of the amino-acid composition of the protein part of TMV. I. Influence of high temperature.] —*Ber. dtsch. bot. Ges.*, **73**, 4, pp. 101–106, 1960.

At Cologne Univ. a str. *thermophilum* was isolated from the wild str. *vulgare* [see below] in Samsun tobacco at 35° C., displaying a distinct yellow-green mosaic though with no or inconspicuous symptoms at 18–25°. However, the analysis of the virus material (which amounted only to $\frac{1}{4}$ of the material at lower temp.) showed no appreciable differences in amino-acid composition of the virus particles synthesized by the cells of the host tissue.

WEHRMEYER (W.). **Die Bildung 'intrazellulärer Stäbe' nach Virusinfektion.** [The formation of 'intracellular rods' after virus infection.] —*Naturwissenschaften*, **47**, 10, pp. 236–237, 3 fig., 1960.

During 1956–58 at the Botanisches Institut, Univ. Münster, and in 1959 at the

Institut für Botanik der Technischen Hochschule, Hanover, Germany, inoculation of the cotyledons of tobacco vars. Samsun and White Burley with tobacco mosaic virus yellow str. G2 regularly resulted in the development after a min. period of 9 days of intracellular rods in a high percentage of the systemically infected secondary leaves [see below]. Both vars. reacted negatively to inoculation with str. *vulgare* [cf. above] and G7. The rods were also formed, predominantly in surface-parallel orientation, in the petiole and leaf-blade tissues, involving both epidermises, including the guard cells and hairs, and the mesophyll. They are intraplasmatic structures, composed of an often visible central filament of variable diam. and a double-refracting sheath; they pursue a straight course (with eventual ramifications) through several cells.

Wehrmeyer (W.). **Entwicklungsgeschichte, Morphologie und Struktur von Tabakmosaikvirus-Einschlusskörpern unter besonderer Berücksichtigung der fibrillärer Formen.** [Phylogeny, morphology, and structure of Tobacco mosaic virus inclusion bodies, with special reference to the fibrillar forms.]—*Protoplasma*, **51**, 2, pp. 165–196, 21 fig., 1959. [53 ref.]

Besides giving a detailed exposition of the nature of the so-called 'coils' [**21**, 169], representing a new type of fibrillar inclusion, the author describes the results of electron-microscope studies at the Botanisches Institut, Univ. Münster, on the structure of the well-known hexagonal prisms [**29**, 539], the single layers of which were shown to run vertically to the axis and to consist of virus particles 500 mμ long in dense parallel arrangement.

Bovÿr (A. D.). Вплив деяких антибіотиків на вірус Тютюнової мозаїки. [The effect of some antibiotics on Tobacco mosaic virus.]—*Rep. Acad. Sci. Ukr.*, **21**, 12, pp. 1359–1363, 1959. [Russ., Engl. summ.]

It was established at Inst. Microbiol., Kiev, that imanine, arenarin, gramicidin, microcide, and the new antibiotic 1604 give considerable inhibition of tobacco mosaic virus in isolated leaves and entire plants of Havana tobacco [cf. **39**, 245, 499]. Imanine was the most active and offers good prospects as a control. Inactivation was partly or completely reversible at relatively low concs., when the virus was titrated on very young indicator leaves of *Nicotiana glutinosa*. In selecting antivirus substances for therapeutic purposes a check must therefore be made for reversibility [cf. below].

Bovÿr (A. D.). Вплив продуктів життедіяльності деяких грибів на вірус Тютюнової мозаїки. [The effect of the products of the vital activity of some fungi on Tobacco mosaic virus.]—*J. Microbiol., Kiev*, **21**, 6, pp. 7–11, 1959. [Russ. summ.]

In further work [cf. above] culture filtrates of *Aspergillus niger*, *Pestalozzia* [*Pestalotia*] *truncata*, *Stachybotrys alternans*, *Trichoderma lignorum* [*T. viride*], and *Trichothecium roseum* strongly depressed the activity of TMV both in isolated leaves and whole plants of Havana tobacco. The effect of comparatively low concs. was partially or fully reversible when the virus was titered on very young indicator leaves of *Nicotiana glutinosa*; with higher concs. and longer treatment reversibility was generally reduced. In the experiments with whole plants, filtrates from *T. roseum* 11642, *T. viride* 468t, and *S. alternans* 12197 gave 70–86% inhibition. Inactivation by the 2 last named was partly reversible but *T. roseum* 11624 offers good prospects as a control.

Kurtzman (R. H.), Hildebrandt (A. C.), Burris (R. H.), & Riker (A. J.). **Inhibition and stimulation of Tobacco mosaic virus by purines.**—*Virology*, **10**, 4, pp. 432–448, 17 graphs, 1960.

Some of this information from the Depts of Plant Path. and Biochemistry, Univ.

Wis., Madison, has been noticed [cf. **39**, 245]; 2-aminopurine, 2,6,8-trichloropurine, and isoguanine inhibited host tissue at lower conc. than they inhibited the virus, while theophylline, 6-mercaptopurine, and 2,6-di(diethylamino)purine had a comparable effect. Caffeine and related compounds, which enhance virus production, may be useful for stimulation of this virus.

Kassanis (B.). **Comparison of the early stages of infection by intact and phenol-disrupted Tobacco necrosis virus.**—*Virology*, **10**, 3, pp. 353–369, 1 fig., 5 graphs, 1960.

The virus str. used in these studies at Rothamsted exp. Sta. originated from a single lesion produced by inoculating a bean (*Phaseolus vulgaris*) leaf with sap from the root of a tobacco plant: it was serologically related to the Rothamsted str. [cf. **22**, 377]. In inoculations of the primary leaves of Prince bean the nucleic acid, obtained by disrupting the parent virus with phenol [cf. Kassanis, **39**, 42], was nearly as infective as the whole virus in 0·06 M phosphate buffer at pH 7, but only about $\frac{1}{5}$ as infective in water. No virus particles could be detected by electron microscopy in the disrupted preparations, and these were rapidly inactivated by dilute solutions of pancreatic ribonuclease, which does not affect the intact virus. Infective centres initiated by disrupted virus started to increase their resistance to inactivation by UV radiation immediately after inoculation, whereas with the intact virus there was a lag of 2–3 hr. Furthermore, newly formed virus became detectable 2–4 hr. sooner when the inoculum was disrupted virus. The first lesions produced by the 2 inocula appeared simultaneously but the final numbers were reached sooner with the disrupted virus. The peak rate of lesion development occurred 4 hr. earlier, when the inoculum was disrupted virus, and the lesions were of more uniform size.

Schmelzer (K.) & Klinkowski (M.). **Die Reaktion einiger Tabaksorten und Differenzialwirte gegenüber den Viren der Tabakätzmosaik-Gruppe. Zugleich ein Beitrag zur Kenntnis der Stämme des Kartoffel-Y-Virus.** [The reaction of some Tobacco vars. and differential hosts to the viruses of the Tobacco etch mosaic group. At the same time a contribution to knowledge of strs. of Potato Y virus.]—*Züchter*, **29**, 5, pp. 229–237, 10 fig., 1959.

A report from the Institut für Phytopathologie, Aschersleben, of the reactions of 12 tobacco vars. and *Solanum demissum* A 6 and *Physalis floridana* to 15 viruses or virus strs. of the 'tobacco etch mosaic' [tobacco etch virus] group, viz. henbane mosaic virus, tobacco etch virus, potato virus Y strs., including the vein necrosis str. [**39**, 242], and potato virus A.

The reactions of V20 [loc. cit.] were the same as those of Virginia Gold A. V20, O32, Ergo, Wohlsdorfer Burley, Havanna IIc, Geudertheimer III, 230/1, F166, and 232, in that order, showed some resistance to the vein necrosis str. Only V20 was fully resistant to tobacco etch virus and the YI and YIII strs. of potato virus Y.

Stouffer (R. F.). **The effect of temperature, inoculation sequence, and stage of disease on the interaction of Potato viruses X and Y in Tobacco.**—*Diss. Abstr.*, **20**, 6, p. 1948, 1959.

In further studies [cf. **39**, 193] at Cornell Univ., regardless of the sequence of mechanical inoculation, potato virus Y only slightly stimulated potato virus X multiplication. In double inoculations introduction of Y before X (both mechanically) resulted in a stronger synergistic interaction than in any other inoculation sequence, which is in direct contrast to the acute-stage leaf situation (the invasion of the 1st uninoculated leaves). In singly inoculated leaves X conc. was highest in the inoculated ones and lowest in those developing after systemic spread or in acute-stage leaves, depending on the interval after inoculation, while in doubly

infected plants it was highest in acute-stage leaves and lowest in the inoculated. The high Xxy/Xx ratios characteristic of the acute-stage leaves after simultaneous inoculation follow the fulfilment of at least 3 requisite conditions: (1) introduction of Y by systemic movement rather than by mechanical inoculation, (2) initiation of Y infection during a critical stage early in the development of the leaf, and (3) presence of X during the logarithmic phase of Y multiplication.

Harrison (B. D.) & Nixon (H. L.). **Separation and properties of particles of Tobacco rattle virus with different lengths.**

Nixon (H. L.) & Harrison (B. D.). **Electron microscopic evidence on the structure of the particles of Tobacco rattle virus.**

Harrison (B. D.) & Nixon (H. L.). **Some properties of infective preparations made by disrupting Tobacco rattle virus with phenol.**—*J. gen. Microbiol.*, **21**, 3, pp. 569–581, 1 pl., 3 graphs; pp. 582–590, 4 pl., 1 diag.; pp. 591–599, 1959.

Some of these studies at Rothamsted exp. Sta. on tobacco rattle [str. of potato stem mottle virus: **39**, 610] have already been referred to [**38**, 650]. The particles were tubular, resembling those of tobacco mosaic virus, with an inner zone surrounding the hole and an outer zone in which transverse bands could be differentiated by staining. Nucleic acid preparations made by the phenol method seemed considerably more infective, relative to the whole virus, than those from other viruses [cf. **39**, 623].

McGrath (H.) & Miller (P. R.). **Blue mold of Tobacco.**—*Tobacco, N.Y.*, **148**, 7, pp. 22–24, 1959.

Most of the information in this detailed comparison of *Peronospora tabacina* infection as it occurs in Australia [cf. **38**, 626] and the U.S.A. has been noticed [cf. **37**, 679].

Hill (A. V.). **Spore release in Peronospora tabacina.**—*Nature, Lond.*, **185**, 4717, p. 940, 1 graph, 1960.

Spore trapping and counts by Commonwealth Sci. Ind. Res. Organization, Canberra, Australia, indicated that under favourable conditions the discharge of conidia of *P. tabacina* [**39**, 500] occurs at 24-hr. intervals for 12–16 consecutive days, with a daily max. between 9.30 and 11 a.m. Operative in the release mechanism are rising temp. and light, but not necessarily the decreasing humidity in the morning, for the cycle was maintained for several days under experimental conditions of low humidity. It is maintained with Pinckard [cf. **21**, 498] that the twisting movements of conidiophores which precede or concur with the discharge are only a facultative phenomenon due to the loss of turgor in the stalk, the actual dispersal being due to 'energy applied at the point of attachment'.

Renaud (R.). **Oïdium du Tabac.** [Oidium of Tobacco.]—*Rev. int. Tabacs*, **34**, 318–319, pp. 151–160; 320, pp. 176–177, 179–180, 1959. [*Tobacco Abstr.*, **4**, 1, p. 13; 3, p. 139, 1960.]

The available information on the morphology, hosts, symptoms, etiology, prophylaxis by the regional adjustment of sanitary and cultural practices, and control (including the use of resistant vars.) of *Erysiphe cichoracearum* is reviewed. The problems presented by the application of karathane and S are discussed. Objections to the former include its brief action-span and the high cost of repeated treatments, and to the latter the risk of impairment of flavour. Colloidal S leaf sprays may provide a solution.

Mitskovski (J.) & Nikolov (K.). **Recherches sur la résistance de différentes variétés du Tabac vis-à-vis l'Oidium.** [Researches on the resistance of different

Tobacco varieties to *Oidium*.] —*Duvan*, **9**, 12, pp. 355–362, 1959. [Serbo-Croat with Engl. summ. *Tobacco Abstr.*, **4**, 3, p. 138, 1960.]

All 23 vars. tested under natural conditions in Yugoslavia were susceptible to *O.* [*Erysiphe cichoracearum*: **39**, 268]. The most resistant were Turkish Samsun, Harmanliska Basma, and Bursa, while a relatively satisfactory performance was given by Greek Samsun, P 10-3 2, Kišniska Jaka, and B 107×125. The most susceptible were VJ2-3 2, Bashi Bagli, Jaka 14-12, Jaka 16/1, Skeče, Jaka 53/1, Izmir, JK 7-4/2, and Greek Basma.

Rosa (M.) & Mickowski (J.). **Ulteriori prove sull'effetto fungicida ed erbicida di alcuni prodotti per la sterilizzazione parziale del terreno.** [Further tests of the fungicidal and herbicidal effect of products used for soil sterilization.]—*Boll. Staz. Pat. veg., Roma*, Ser. 3, **17** (*1959*), 1, pp. 71–90, 4 fig., 2 graphs, 1960. [Engl. summ.]

In tests during 1959 at the Tobacco Inst., Prilep, Macedonia, in large seed-beds in which tobacco is grown every year, vapam (1%), vapam+allyl alcohol (1%), crag mylone 85 W (0·4%), bedrench (1·5%), and DD+allyl alcohol [cf. **39**, 46] applied 20 days before sowing all gave effective control of *Thielaviopsis basicola* and significantly reduced the emergence of 6 spp. of weeds, though not of *Trifolium* sp. As the materials were equally effective as fungicides and as herbicides, combined treatment with DD or vapam+allyl alcohol is unnecessary. In the seed-beds concerned soil treatments should be applied in conjunction with improved cultural practices.

Marcelli (E.). **Sull'azione antioidica di nuovi fungicidi a base di nitroderivati del fenolo.** [On the effect upon powdery mildew of new fungicides containing nitroderivatives of phenol.]—*Tabacco, Roma*, **64**, 694, pp. 74–79, 2 graphs, 1960. [Engl. summ.]

In further field and greenhouse tests at the Laboratorio di Fitopatologia dell' Istituto Scientifico Sperimentale per i Tabacchi, Scafati, against tobacco powdery mildew [*Erysiphe cichoracearum*: **37**, 376], plants were sprayed in mid Aug. or mid Sept. with karathane, caprol, and 3 other materials (C.F.B., N.F.C., and N.F.B.) chemically similar to karathane but with a lower degree of nitration. With the Aug. treatments only N.F.B. proved comparable to karathane, and in the Sept. tests it was the same, while the protection afforded by the other 3 treatments was appreciably increased, their greater volatility being offset by the lower temps.

Marcelli (E.) & Capozzi (A.). **Sull'azione di alcuni antibiotici sul Tabacco.** [On the effect of some antibiotics upon Tobacco.]—*Tabacco, Roma*, **63**, 693, pp. 371–384, 1 graph, 1959. [Engl. summ.]

In further work [cf. above] the antibiotics 'eritrocina', 'cloramfenicolo', tetracycline, aureomycin, bimixin, streptomycin, and 'fumagillina' at concs. at which they had been ascertained to be toxic to *Pseudomonas tabaci* (10^{-3}, 10^{-4}, and 10^{-5}) were tested on germinating seeds of Burley Guiseppina tobacco, on seedlings of Bright Italia tobacco, and on *Lupinus albus* seeds germinated in sand in containers. The results showed that the materials tested inhibited growth to a greater or a lesser extent, the effect being most conspicuous on recently germinated seeds and decreasing as the seedlings developed. White and whitish-yellow spots appeared on the leaves of the treated tobacco seedlings.

MacNeill (B. H.) & Ismen (H.). **Studies on the virus-streak syndrome in Tomatoes.** —*Canad. J. Bot.*, **38**, 1, pp. 9–20, 1960. [22 ref.]

A more detailed account of information which has already been noticed in part [**38**, 373]. The expression of the disease varies with the characteristics of the

2 causal component viruses, tobacco mosaic virus (TMV) and potato virus X; the extreme severity of streak in greenhouse and field tomatoes in Ontario is associated with a geographic str. of TMV which induces primary local lesions in petunia. Symptoms of the disease are masked above 26° C.

Smith (H. C.) & Hurndell (L. C.). **Control of Didymella stem rot of Tomatoes.**—*N.Z. J. Agric.*, **99**, 6, pp. 577, 579, 581, 583, 1 fig., 2 diag., 1959.

A useful, popular paper on *D. lycopersici* [**33**, 140], giving its life history and the results of spray trials. The disease has recently become more serious in the main tomato-growing areas of the S. Island. Measures recommended include a fortnightly spray with captan (5 lb. of 50%/100 gal.) to all parts of the plant, particularly the stem and the soil at the base. In trials for resistance all 4 vars. tested were unsatisfactory.

Goldenberg (J. B.). **Método 'standard' para la obtención de inóculo de Septoria lycopersici Speg. causante de la viruela del Tomate.** [Standard method for obtaining inoculum of *S. lycopersici*, causative agent of Tomato leaf spot.]—*Rev. Invest. agric., B. Aires*, **13**, 1, pp. 105–110, 2 graphs, 1959. [Engl. summ.]

Inoculum of *S. lycopersici* [**29**, 180] for use in resistance tests at the Inst. de Fitotecnia, Castelar, Argentina, was grown in Erlenmeyer flasks on 1% potato glucose agar. After incubation glass beads (3 mm. diam.) and distilled water were introduced and the flasks were shaken to dislodge the spores with the least possible damage to the mycelium. Cultures 14–21 days old, obtained from fresh spores, produced many spores with a high percentage of germination. After 21 days spore production increased but germination diminished considerably.

Boothroyd (C. W.). **Cross-inoculation of Tomato and Corn with Gibberella.**—Abs. in *Phytopathology*, **50**, 4, p. 239, 1960.

Green fruit of 4 tomato vars. and stalks of a maize hybrid were inoculated (by toothpicks) with isolates of *G. zeae* from tomato fruit [**39**, 50] and maize stalks and *G. fujikuroi* from maize stalks. *G. zeae* rotted the tomato fruit regardless of source of isolate and formed macroconidia and then perithecia: *G. fujikuroi* did not attack tomato. Both spp. rotted maize tissue, the isolate of *G. zeae* from tomato being as virulent as those from maize, though only 1 (from maize) produced perithecia.

Hille (M.). **Das Verhalten des deutschen Tomatensortimentes gegenüber Synchytrium endobioticum (Schilb.) Perc.** [The reaction of the German Tomato collection to *S. endobioticum*.]—*NachrBl. dtsch. PflSchDienst, Stuttgart*, **12**, 1, pp. 12–14, 1960. [Engl. summ.]

All the tomato vars. recognized by the Deutsches Bundessortenamt up to 1958, and in addition Bergs Moneymaker, Immun, Kondine Red, Priora, and Weibulls Immuna/56, were found susceptible to *S. endobioticum* when tested at the Biologischen Bundesanstalt, Institut für Botanik, Brunswick, by a method previously described [**39**, 246]. Sporangia formed in tomato are infectious for potato [cf. **4**, 698]; thus tomato is a possible source of new races. To date the Ukrainian government is alone in having introduced legislation forbidding the cultivation of tomatoes where the presence of potato wart has been established [**39**, 615].

Sinadskiĭ (Y. V.) & Bondartseva (Mme M. A.). Заболевания древеснокустарниковых пород в тугайных лесах Сыр-Дарьи. [Diseases of trees and shrubs in the 'tugai' forests of the Sȳr-Dar'ya.]—*Bot. Zh. S.S.S.R.*, **45**, 3, pp. 423–429, 5 fig., 1960.

Results are presented from the V. L. Komarov Bot. Inst., Leningrad, of studies

during 1957 in S. Kazakhstan forests of the flood plain of R. Sŷr-Dar'ya, particularly in 31,000 h. of the Kizil Kum and Turkistan Forestry Establishments. In all, 25 spp. were identified, mainly wood-destroying fungi, mostly polypores. These included *Inonotus pseudohispidus*, mostly on *Populus pruinosa*, infection being 20–25% in Kizil Kum and 10–15% in Turkistan; *Trametes suaveolens* on live and dead trunks and stumps of *P. pruinosa*, *P. ariana*, and *Salix songorica* (5th growth class and over), with up to 5% of trees infected (Kizil Kum), and *Funalia* [*Trametes*] *trogii* on *P. ariana* (25% infection at Beshtal, Kizil Kum); and *I. tamaricis* on trunks of *Tamarix ramosissima* (10% at Kizil Kum and 20% in Turkistan). There were frequent occurrences of *Melampsora populina* on poplar with 30–50% infection, and in some places 100%. *S. songorica* was also 8–10% infected by *Septoria didyma* var. *santonensis*.

Slankis (V.). **Mycorrhiza of forest trees.**—*Proc. N. Amer. For. Soils Conf.* 1, pp. 130–137, 1958. [93 ref.]

This paper, read at Mich. State Univ., E. Lansing, in Sept. 1958, reviews briefly the general morphological and anatomical characteristics of mycorrhiza and their role in supplying nutrients and fungal metabolites to the trees, the influence of the fungus on the development of the entire root system, and some of the principles that underlie the initiation and establishment of the mycorrhizal association.

Moser (M.). **Die künstliche Mykorrhizaimpfung an Forstpflanzen. II. Die Torfstreukultur von Mykorrhizapilzen. III. Die Impfmethodik im Forstgarten.** [Artificial mycorrhizal inoculation of forest trees. II. Culture of mycorrhizal fungi in peat litter. III. The method of inoculation in the nursery.]—*Forstwiss. Zbl.*, **77**, 1–2, pp. 32–40, 2 fig., 1 graph; 9–10, pp. 273–278, 2 fig., 1958; **78**, 7–8, pp. 193–202, 3 fig., 2 graphs, 1959.

The 1st of these papers from the Forstl. Bundesversuchsanstalt, Mariabrunn, Bodenbiologisches Institut, Imst, Austria, describes the isolation of various mycorrhizal fungi by plating fragments of young sporophores on agar, and their subsequent culture on malt extract and bean meal media. A list is given of those associated with *Pinus cembra*, *P. sylvestris*, larch, and spruce successfully cultured by the method.

For inoculation (II), it was better to apply a culture of the fungus in peat litter, than to apply an agar or liquid culture directly. Peat dust, or a mixture thereof with leaves of the appropriate tree partner, is sterilized and enriched with glucose, potassium phosphate, and ammonium tartrate or sulphate. Certain spp. also require lime, and others such growth substances as aneurin and biotin in minimal quantities. The cultures were found to do best from Dec. or Jan. to May, the most favourable time for inoculation thus being Apr.–June, according to altitude.

In the 3rd paper are discussed various methods for inoculating nursery soil.

Agnihothrudu (V.) & Hadfield (W.). **A new species of Haplosporella from Assam.**—*J. Indian bot. Soc.*, **38**, 4, pp. 546–548, 4 fig., 1959.

A fungus found in the campus of Tocklai exp. Sta., Cinnamara, Assam, on dead snags and bark of *Aleurites montana* and suspected of causing a die-back, was named *H. aleuritis*. Its obtusely papillate pycnidia (3–5) measuring 150–225 × 70–150 μ were immersed in botryose groups. Thick-walled, subellipsoid or obovoid conidia, often with a hilum, 16–20 × 10–12 μ, turned from subhyaline to fuscous with maturity.

Nizkovskaya (Mme O. P.), Milova (Mme N. M.), Shivrina (Mme A. N.), Lovyagina (Mme E. V.), & Platonova (Mme E. G.). К вопросу биологии и биохимии культуры чаги. [Concerning the biology and biochemistry of a

'chaga' culture.]—*Ex* Физиология и биохимия микроорганизмов [Physiology and biochemistry of micro-organisms.] –Труд. Инст. Микробиол. [*Trud. Inst. Mikrobiol.*], *1959*, 6, pp. 277–285, 2 fig., 5 graphs, 1959.

The 'chaga' is the abortive sporophore of *Poria obliqua* [**37**, 740], the cause of a well-defined white heart rot of birches and other trees. Substances prepared from it have been recommended by the Pharmacological Committee, Acad. Council of the Ministry of Health, U.S.S.R., for use in treating non-operable cancer, and ulcerative diseases and gastritis. There is no differentiation in the aborted sporophores [cf. **35**, 130] which appear at the site of the initial infection and consist of uniform fungal filaments. The conditions for their development were studied in culture, using strs. of *P. obliqua* from *Betula verrucosa* from Mel'nikovo, Leningrad region, *B. platyphylla* from Khabarovsk, *B. costata* from Primor'e, and *Alnus glutinosa* from the Leningrad region. Opt. temp. for growth is 26–28° [C.], and the opt. pH 5–5·5. The chemical composition of the sporophores was also studied; these varied little according to the geographical area. A culture gave a 20% destruction of cellulose in 6 months. Some strs. gave an av. 25% destruction of birch wood in 11 months, and the str. from *A. glutinosa* 33%. A pigment complex identical with the natural one was formed only in media containing native lignin; biological lignin gave a two-fold acceleration to its formation.

Robert (A.). **Insect vectors of the Dutch Elm disease in the Province of Quebec.**—*Proc. 10th int. Congr. Ent., 1958*, **4**, pp. 433–436, 5 fig., 1958. [Fr. summ.]

Experiments in 1951 with weevils which feed on elm leaves and bore into the bark showed that *Magdalis barbita* and *M. armicollis* are able to transmit *Ceratocystis ulmi* [**39**, 534].

Kurtzman (R. H.) & Stessel (G. J.). **Elm cottony tip blight.**—Abs. in *Phytopathology*, **50**, 4, p. 240, 1960.

In May 1959 leaves and twigs of current season growth of elms at Kingston, R.I., were blighted by abundant, white, extra matrical mycelium during a period of abnormal humidity. Within 3–5 days the 'cottony' growth gave rise to black sclerotia, 2–7 mm. diam. The fungus, which reproduced the disease on inoculation of seedlings under moist conditions, is apparently a type of *Sclerotium*.

Cunningham (T. M.). **Seed and seedling survival of Eucalyptus regnans and the natural regeneration of second-growth stands.**—*Appita*, **13**, 4, pp. 124–131, 2 graphs, 1960.

Factors contributing to the heavy mortality of seed were shown by studies at the School of Forestry, Univ. Melbourne, Australia, to include high soil temps. and infection by [unspecified] fungi, the latter also being largely responsible for winter losses of seedlings, which are increased by dense shade.

Himelick (E. B.). **Experimental control studies on the Oak wilt disease.**—*Diss. Abstr.*, **20**, 5, pp. 1554–1555, 1959.

The timber loss caused by oak wilt (*Ceratocystis fagacearum*) [**38**, 718] in a forested area of northern Ill. was reduced in 5 yr. from 6·3 to 1·9% of the annual production through the use of control practices. The basic method was to poison healthy oak trees within root-grafting distance of current infected trees. Trees were killed most rapidly with Na arsenite, which also limited mat formation, reduced insect activity, and caused some root-kill on treated trees.

Poison barriers were established on the assumption that root-graft spread of the oak wilt fungus is related to the size of trunks and distance between diseased and healthy trees. During the 5-yr. period, with poison barriers round 571 current-yr.

infected trees, 4 in. diam. or more, only 12 beyond the barrier and within grafting distance of poisoned healthy trees became infected.

Of 6 chemicals tested for their effectiveness in killing oak roots when applied to the soil in a limited zone about the tree, vapam and methyl bromide killed all roots as large as 3 in. diam. and to a depth of 3 ft. In an attempt to use the fungus to eliminate unwanted oak brush in pine plantations, over 97% of the oak stems inoculated were killed within 2 yr.

Bart (G. J.) & Young (H. C.). **White Oak resists wilt fungus.**—*Trees Mag., Ohio*, **19**, 1, p. 14, 1958. [*For. Abstr.*, **20**, 3, pp. 413–414, 1959.]

White oaks are more resistant to wilt [*Ceratocystis fagacearum*: **39**, 506] than red or black. An experiment to determine how fast the fungus moves showed that movement in white oak is limited compared with red. This cannot, however, be due merely to the natural, mechanical obstructions in the vessels as a known conc. of spores suspended in water could be drawn with equal ease through stem sections of both spp.

Engelhard (A. W.) & Bragonier (W. H.). **Squirrels as possible vectors of the Oak wilt fungus in Iowa.**—*Plant Dis. Reptr*, **44**, 3, pp. 192–196, 2 fig., 1960. [26 ref.]

Observations by Iowa agric. Exp. Sta., Ames, suggest that the oak wilt fungus (*Ceratocystis fagacearum*) [**39**, 54] may be transmitted by the grey squirrel (*Sciurus carolinensis*) [**35**, 559], which feeds on the fungus mats and pads. Also, wounds made by squirrels may be infected by insect carriers.

Semenkova (Mme I. G.). Некоторые данные о микофлоре желудей разного происхождения. [Some data on the mycoflora of acorns of different origin.]—*Proc. Timiryazev agric. Acad., 1959*, 48, pp. 105–108, 1959.

Penicillium spp., *Trichothecium roseum*, *Phomopsis quercella*, and *Sclerotinia pseudotuberosa* were identified at this Academy, Moscow, in most samples of acorns from a large area of European U.S.S.R. and Georgia [cf. **39**, 129]. Of locally restricted but potentially dangerous spp., *Gloeosporium quercinum* was frequent on samples from Lithuania and the Moscow, Voronezh, and Tambov regions, and *Cytospora intermedia* on those from the Crimea and Georgia.

Wakimoto (S.), Ikari (H.), & Yoshii (H.). **Relation between polyphenols contained in plants and phytopathogenic fungi. II. On some polyphenols from the Paulownia tree and their additive effect on the growth of the pathogenic fungus, Gloeosporium kawakamii, in culture. III. Decomposition of C^{14} labelled polyphenol from leaves of the Paulownia tree by G. kawakamii Miyabe.**—*Ann. phytopath. Soc. Japan*, **24**, 4, pp. 195–200, 3 fig.; pp. 201–206, 3 fig., 1959. [Jap. Abs. from Engl. summ.]

In further studies at Kyushu Univ., Fukuoka [cf. **38**, 142], no definite differences in the total polyphenol content were detected in healthy and *G.* infected leaves of *Paulownia* trees [**35**, 249] but considerable quantities of *o*-dihydroxyl type of polyphenols were detected in infected trees. Addition of chlorogenic acid and rutin, both present in *P.* leaves, to synthetic media to a conc. of 10^{-3}M significantly promoted growth of *G. kawakamii*. On synthetic media containing rutin, quercetin, phloroglucinol, protocatechuic acid, and glucose+rhamnose (each at 10^{-3}M) mycelial dry wt. was highest with the 1st 3 flavonoids.

Results of experiments described in part III in which polyphenols labelled with C^{14} were isolated from *P.* leaves (by a method described) and added to Tomizawa's synthetic medium on which *G. kawakamii* was cultured indicate that the fungus could absorb and utilize polyphenols from the leaves; a part of the polyphenols was decomposed by the fungus and released as CO_2.

Snyder (H. D.). **Control of anthracnose of American Sycamore and London Plane.** —*Diss. Abstr.*, **20**, 6, p. 1954, 1959.

A marked difference was apparent at Rutgers Univ. among individuals of *Platanus occidentalis* (American sycamore) in their degree of susceptibility to *Gnomonia veneta* [*G. platani*: **34**, 757]. The perfect state was not found. Cankers, the most important source of inoculum, were observed at 2–3 ft. of living branch throughout the entire crown in native trees. Pollarding or thorough pruning, as practised in N.J., gave partial to good control of anthracnose, but not the application of 3–5 or more foliar or protective sprays. One delayed dormant or bud-break application of PMAS (phenyl mercury acetate 10%) at 1 pint/100 gal. by mist blowers gave the best control: hydraulic spraying resulted in twice as many healthy leaves, about $\frac{2}{3}$ as many living twigs, about $\frac{1}{4}$ as many blighted twigs, and nearly 6 times as many fruit; there was also less defoliation on sprayed than unsprayed trees.

London plane (*P. acerifolia*) receiving one bud-break PMAS spray had an av. of 7·3% necrotic leaves compared with 22·7% for unsprayed portions, which had nearly 12 times as many blighted twigs. Beneficial physiological effects of the PMAS spray noted the following year included greener colour in later formed leaves, appreciably larger leaves, longer current year's shoots and almost complete elimination of aborted buds. Timing of the spray application is very critical as its effective period is very brief.

Corte (A.). **Ricerche sperimentali sul 'mosaico' del Pioppo.** [Experimental researches on Poplar 'mosaic'.]—*Atti Ist. bot. Univ. Pavia*, Ser. 5, **17**, pp. 222–234, 2 pl., 1960. [Engl. summ.]

In the summer of 1957, plants of the clone I 154 of *Populus* × *euramericana* at Univ. Pavia, Italy, developed symptoms of mosaic [cf. **39**, 248]. Similar symptoms were noted on cultivated poplars in different parts of Pavia, Piedmont, Alessandria, and Turin. In Lombardy and Piedmont symptoms increase from mid-June to a max. in July, subsequently largely disappearing. They vary considerably, but in general a minute, whitish spotting affects veins of the 4th and lower orders and the adjoining parenchyma. This may become confluent and later turn amber-yellow. There is also ring spotting and sometimes on a few leaves polygonal chlorotic areas near the leaf margin, bordered by the veins. Premature leaf fall may occur and there may be leaf rolling.

The disease was transmitted experimentally by chip-budding from a plant of I 154 to trees of I C4. On this clone chlorotic areas enlarged rapidly, and involved a large part of the leaf. Affected leaves were very small and premature defoliation was heavy by midsummer. Vegetative growth was greatly reduced, 1 yr. later the circumference of the trunk being 30% smaller than that of uninoculated trees.

The disease appears to be identical with that reported from Bulgaria [**14**, 462] and from Yugoslavia [**32**, 44]. From information received it seems that it is also present in Holland.

Stefanov (D.). Една опасна болест по Тополите у нас. [A serious disease of Poplars in Bulgaria.]—*J. Bulg. For. Soc.*, **13**, 10, pp. 461–463, 1957. [Abs. in *Referat. Zh. Biol.*, *1960*, 3, p. 181, 1960.]

Recently *Dothichiza populea* [cf. **37**, 742] has been widely distributed on poplar in Bulgaria, Canadian poplar being especially susceptible. *Populus candicans* and *P. beroliensis* are resistant. Spraying with 1% Bordeaux mixture is recommended after the appearance of leaves, and a repetition with 2–3% after rain.

Schwenke (H. J.). **Untersuchungen über den Parasitismus von Septotis populiperda Waterman et Cash.** [Studies on the parasitism of *S. populiperda*.]—*Phytopath. Z.*, **38**, 1, pp. 69–92, 3 fig., 7 graphs, 1960. [Engl. summ.]

In this further study [**39**, 129] at the Inst. für Forstpflanzenkrankheiten, Hann.-

Münden, Germany, microscopic investigation of the infection process in poplar leaf infections showed that *S. populiperda* first kills the host tissue by means of metabolic products and then immediately colonizes it. Both infection and spread depend on air humidity; if this falls below 90% growth will cease, to be resumed when the R.H. rises again. A cessation of growth for 10–11 days causes the formation of a demarcation zone by the deposition of tannic substances which cannot be penetrated by the fungus. Inoculations on the bark developed differently according to the season, a high rate of infection occurring at the time of leaf flush, invariably leading to the death of the shoot. After leaf flush the frequency of infection diminished and did not lead to the death of the twig. In summer no infection occurred in healthy poplars, while in autumn the frequency of infection increased again, though no shoots were killed. But if the infected shoots were used as cuttings the following spring up to 77% were killed by the fungus. The resistance of the bark in summer could be ascribed to mechanical demarcation. After mechanical infection of the petiole the fungus penetrates into the bark of the twig. Infection of the leaf scars occurs only in autumn on unlignified shoots with defective water balance if the leaf scar is uncovered 3–4 weeks before leaf fall.

The disease symptoms, differing according to the season, produced experimentally on poplar shoots and cuttings indicate the identity of *S. populiperda* with the *Septogloeum populiperdum* described by Johannes [**32**, 156; **38**, 427].

Pospíšil (J.). **Houbový škůdce na Osice Venturia tremulae Aderh.** [Fungal infection of Aspen by *V. tremulae*.] — *Lesn. Práce*, **38**, 6, pp. 257–260, 1959. [Abs. in *Referat. Zh. Biol., 1960*, 5, p. 190, 1960.]

Heavy infection by *V. tremulae* in 1–3-yr.-old aspen seedlings occurred in forestry nurseries at Brno, Czechoslovakia, in 1955 and 1958. Infection spreads via the midrib and petiole to the stem, where a black patch develops at the site of infection. The leaves of seedlings above the infected place darken and wilt; with severe infection the stem cracks. If infected leaves are removed in time, infection will not pass to the stem. Hybrid seedlings from aspen × poplar crosses are resistant. Spraying with 1% Bordeaux mixture or 5% Cu sulphate is advocated.

Gushchin (I. I.). Распространение краснины в стволиках Осины в зависимости от числа ранок и их размеров. [The spread of staining in Aspen stems in relation to the number and size of wounds.] -Науч. Докл. высш. Школ. [*Nauch. Dokl. vŷssh. Shkol.*], Les. Delo, *1958*, 4, pp. 39–43, 1 fig., 1958.

A permanent test plot (0·25 ha.) was established in the Lesodolgorukovskoe forest to determine the origin and spread of *Fomes ignarius* f. *tremulae* causing heart rot of *Populus tremula* in the Moscow region [cf. **38**, 629]. After felling in the winter of 1954–5 root suckers emerged throughout the growing period of the 1st yr. Before frost in the autumn 10,440 suckers were cut near the root. There was no sign of staining, though most were damaged, having wounds, insect incisions, sunburns, etc. In 1-yr.-old stems wounds had not healed, either remaining open or covered by a thin dead yellow skin. Among the suckers appearing before 5 May, 20 were split along the heart wood, with red stain round the wounds. The amount of stained wood was proportional to the number and size of the wounds. The large number of wounds in 1-yr.-old poplars results from the rapid growth in height owing to the strongly developed root system remaining on the mother tree. Stained wood is more frequent in the lower part of the stem and round large wounds. Stain from the wounds spreads more quickly to the crown than to the butt.

Ciferri (R.) & Corte (A.). **Gli 'scopazzi virosici' della Robinia pseudoacacia, malattia nuova per l'Italia.** [Virus witches' brooms of *R. pseudoacacia*, a new

disease for Italy.]—*Atti Ist. bot. Univ. Pavia*, Ser. 5, **17**, pp. 122–128, 3 pl., 1960. [Engl. summ.]

This disease [cf. **22**, 2] has been found in Pavia on mature trees of horticultural vars. and on semi-cultivated shrubs planted for the consolidation of railway embankments [cf. **22**, 3].

It is similar to the *Robinia* brooming virus disease of N. America [loc. cit.]. In addition to the symptoms described there the disease causes numerous modifications in the shape of the leaflets and an interveinal mosaic varying from a striping to an indistinct ring-spot. It appears to be new to Europe and may have been imported from the United States, though a similar disease was found on elm and hackberry (*Celtis australis*) in Italy in 1915 by E. Pantanelli (*Staz. sper. agric. ital.*, Pl. 51, pp. 214–219, 1918).

Blattný (C.). **Viróza a z virózy podezřelá nemoc Trnovníku Akátu (Robinia pseudoacacia L.).** [A virosis and a suspected virus disease of *R. pseudoacacia*.]—*Ann. Acad. tchécosl. Agric.*, **5**, 3, pp. 291–294, 1959. [Russ., Germ. summ. *For. Abstr.*, **20**, 4, p. 592, 1959.]

Of 2 diseases of *R. pseudoacacia* found in Czechoslovakia, one is identical with or closely related to brooming disease [*Robinia* brooming virus: cf. above] and was observed at several places in Bohemia and Slovakia, while the other, which takes the form of a leaf deformation, was noted in various localities in Slovakia, and resembles the virus disease of *Gleditschia triacanthos* found in Bulgaria [cf. **14**, 462].

Iyengar (A. V. V.). **The relation of soil nutrients to the incidence of spike disease in Sandalwood (Santalum album Linn.).**—*Indian For.*, **86**, 4, pp. 220–230, 1960. [30 ref.]

At Malleswaram, Bangalore, chemical analysis of sandal leaves, twigs, and roots revealed a disturbed N, Ca, and to some extent K metabolism in spike-infected plants [**38**, 167]. Lime deficiency and N excess in vegetative organs along with Ca excess in roots—Ca/N ratios for roots were 4·36 (infected) and 0·41 (healthy)—are attributed to the disturbance of the accumulation-depletion mechanism of the roots. These differences suggest inability of the root-ends to absorb Ca, and also point to soil as a Ca source for sandal; the absence of similar differences in N content of the underlying soil indicates that N is obtained from the host, which is in accord with sandal thriving on leguminous hosts.

Bagchee (K.). **Fungal diseases of Sal (Shorea robusta Gaertn.). V. The heart rot of Sal caused by Trametes incerta (Curry) Cooke.**—*Indian For. Rec.*, N.S., Mycol., **2** (*1958*), 4, pp. 61–69, 2 pl. (4 fig.), 3 fig., 1959.

This study [cf. **38**, 230] revealed serious losses from this disease in virgin stands of sal in Central India [**32**, 158]. Symptoms include a parched, dry appearance of the trees, deformation and spindling of the stems, poor foliage, thin crowns, and disappearance of the main stem resulting in stagheadedness and table-topped formation of the trees. Growth usually ceases at the pole stage; die-back occurs in extreme cases. Stems of larger trees may break in the middle in the advanced stages of rot and secondary shoots may be produced on the stumps. On better soils sporophores are formed on the tree at 6 to 30 ft. Control measures recommended include removal of infected trees and litter, coating the cut stumps with coal tar, and protection against mechanical damage, drought, and fire.

Bose (S. R.) & Bonet-Maury (P.). **Étude du métabolisme du phosphore 32 dans Ganoderma applanatum var. australe.** [A study of the metabolism of P^{32} in *G. applanatum* var. *australe*.]—*Bull. Soc. mycol. Fr.*, **75**, 4, pp. 427–433, 4 fig., 1959.

In studies at the Kar Medical Coll., Calcutta, the Muséum nat. d'Hist. nat., Paris

and the Inst. du Radium, Paris, a lime tree (*Tilia* sp.) bearing 9 small sporophores of *G. applanatum* var. *australe* at a height of about 1 m. above the ground was given an injection of P^{32} containing 100 μc 2 cu. cm. Four days later the spores, which were ejected continuously night and day, were highly radioactive, as were the sporophores. Germination was reduced and the affected spores grew more slowly than normal ones on a solid medium. A few sporophores on the same tree received a direct injection of a solution containing 1 cm. ml. of P^{32}. After 4½ days there was accumulation of P^{32} near the surface of the hymenium.

Low (J. D.) & Gladman (R. J.). **Fomes annosus in Great Britain. An assessment of the situation in 1959.**—*For. Rec.* 41, 22 pp., 17 pl., 4 maps, 1960.

This survey by the Forestry Commission [cf. **38**, 714] sums up the extent of present day infection of conifers [**39**, 251] in Great Britain and the building-up of infection; its spread, rate, and mode of development are assessed; the effect of different conifer spp. and control means by treating stumps are discussed. It is concluded that adoption of stump treatment generally would be justified except in a few plantations where the disease is unlikely to occur.

Forest Pathology.—*Rep. For. Inst. Oxf.*, **35** (*1958–1959*), pp. 13–15, 1959.

This report [cf. **37**, 601] notes that *Nectria cucurbitula* was commonly found among the fungi associated with bark necrosis on main stems of spruce. Inoculations indicated that *Pythium* spp. isolated from soil may act as parasites and cause death of finer roots and debility of spruce trees. Slow but still satisfactory growth was noted in Douglas fir [*Pseudotsuga menziesii*] and markedly retarded growth in Corsican pine when their roots were kept at 36° F. and their crowns at 60°.

Hunt (J.). **Phytophthora lateralis on Port-Orford-Cedar.**—*Res. Note Pacif. Nthwest For. Exp. Sta.* 172, 6 pp., 1 map, 1959.

The symptoms and history of root disease in the highly susceptible *Chamaecyparis lawsoniana* caused by *P. lateralis* [cf. **38**, 547; **39**, 58 *et passim*] are outlined. It is now established along the western fringe and at one spot in the heart of the natural range of this host. Affected roots have sharply delimited dark brown zones in the bark, often accompanied by a black resinous line in the cambium. Dying trees first turn yellow, then red and brown. The disease has certainly been in the area since 1937 [cf. **21**, 41], probably since 1923.

Kobayashi (T.). **Phomopsis disease of Japanese Cedar, Cryptomeria japonica D. Don with special reference to the life-history and taxonomy of the causal fungus.**—*Bull. For. Exp. Sta Meguro* 107, pp. 1–25, 3 pl., 2 fig., 1958. [Jap., Engl. Received 1960.]

It was established by culture and inoculation that *Diaporthe conorum* from Japanese cedar is the perfect state of *Phomopsis* from the same host, and identical with the fungus described as *P. occulta* on *Abies sachalinensis*; *P. cryptomeriae*, *P. occulta* and *P. pseudotsugae* are treated as synonyms of *D. conorum*. The fungus can enter the host only via wounds and some dead tissue is necessary for lesion development; it grew well on Saito's soy agar and potato sucrose agar (opt. temp. 20–28° C.). Ascospores germinated at 12–35° (opt. 23–28°) and pycnospores at 9–37° (opt. 25°–30°).

Minkevich (I. I.). Лесопатологи в помощь таксаторам. [Forest pathologists as aids to assessors.]—Лес. Хоз. [*Les. Khoz.*], **12**, 3, pp. 40–42, 2 fig., 1960.

During forest surveys in 1959 in the river Nyui basin, Lenskiĭ region, Yakut A.S.S.R., *Fomes officinalis* [**16**, 358] was noted on 210 larches, fruit bodies occurring on 56. Of the trees studied, 80% had suffered fire damage and 11% mechanical

damage. Infection was clearly evident in plantations of the VIII–IX age group and over. Crown dessication was present in 94% of the infected trees studied, in the majority involving 20–40% of the crown, being highest in the IX+ age group.

GREMMEN (J.). **A contribution to the mycoflora of Pine forests in the Netherlands.** —*Nova Hedwigia*, **1** (*1959*), 3–4, pp. 251–288, 8 pl. (42 fig.), 1960. [40 ref.]

Descriptive notes (with fig. of the fructifications and spores) are given on 45 spp., mainly ascomycetes, on the trunks, branches, needles, and cones of *Pinus sylvestris*, *P. nigra* var. *austriaca*, and *P. nigra* var. *corsicana* [cf. **38**, 430, 491]. For some, new data obtained from cultures are given on the imperfect states. Included are *Lophodermium pinastri*, *Sclerophoma pithyophila*, *Cenangium acuum*, all on *P. sylvestris* (the last-named fungus is rather a common inhabitant of pine needles and is often accompanied by *S. pithyophila*), and *Crumenula pinicola* on *P. nigra* var. *austriaca*.

FOSTER (A. A.). **Nursery diseases of southern Pines.** *For. Pest Leafl. U.S. Dep. Agric.* 32, 7 pp., 3 fig., 1959.

Pine seedlings grown in forest tree nurseries in the South in the 1957–8 season were affected by the pre- and post-emergence damping-off [cf. **35**, 797] (*Pythium*, *Rhizoctonia*, and *Fusarium*), black root rot (*Sclerotium bataticola* [*Macrophomina phaseoli*: **31**, 307; cf. **38**, 550] and *Fusarium oxysporum* [**35**, 731]), fusiform rust (*Cronartium fusiforme*) [**38**, 629], brown spot (*Scirrhia acicola*) [**38**, 721], and chlorosis [**35**, 797].

MEREDITH (D. S.). **Further observations on fungi inhabiting Pine stumps.**—*Ann. Bot., Lond.*, N.S., **24**, 93, pp. 63–78, 1960. [18 ref.]

In further studies in E. Anglian plantations [cf. **39**, 131] the growth rates on malt agar and in stump wood of early colonizers, such as *Fomes annosus*, *Peniophora gigantea*, *Stereum sanguinolentum*, and *Leptographium lundbergii*, were higher than those of several agarics which colonized later. The initial invasion of roots generally proceeds via the stump by fungi which infect the cut surface, the proximal ends of lateral roots often being invaded 6–9 months after the stump surface has become infected. No evidence was obtained that ring-barking 6 months before felling affects the rate of spread of *F. annosus*, *P. gigantea*, or *L. lundbergii* in stumps.

In warm, dry conditions stumps may dry out soon after felling, fungal growth probably becoming limited; moisture gradients were established for stumps 5 months old, the moisture content being lowest at the top. The evidence indicated that small stumps dry out more rapidly than larger ones.

Stump decomposition is often complete 8–9 yr. after felling. The moisture content of stump wood tends to increase as decay progresses. Decomposition is associated with a succession of fungi: a *Peniophora* stage, characterized by an abundance of stump-surface colonizers, such as *P. gigantea*, *F. annosus*, *S. sanguinolentum*, and various blue-stain fungi, including *Ceratocystis* spp., all these usually remaining dominant for 2–3 yr. after felling; then a *Hypholoma* stage, in which agarics appear, *H. fasciculare* often being the most common, together with polypores, such as *Polyporus amorphus* and *Polystictus abietinus*; and, finally, a *Tricholoma* stage, with *T. rutilans* usually dominant. The numbers of phycomycetes and fungi imperfecti, including *Mucor* spp., *Gliocladium* spp., and *Trichoderma viride*, increase with age of stump.

Peniophora gigantea is a vigorous competitor of *F. annosus* for the colonization of newly cut stumps, but its ability to colonize is much reduced if *F. annosus* is already established. *G. viride* and *T. viride* occasionally replace wood-rotting basidiomycetes.

Stumps in which other fungi have been established for some time are unlikely

to be colonized extensively by *F. annosus* and *P. gigantea*; stumps of trees killed by *F. annosus* are colonized by saprophytes to a less extent than stumps of healthy trees.

Menzel (K.). **Vier Jahre Kiefernschüttebekämpfung im Staatlichen Forstamt Kleve/Ndrh.** [Four years of control of Pine needle cast by the State Forest Bureau, Kleve Ndrh.]—*Allg. Forstz.*, **14**, 26, pp. 467–468, 1 fig., 1959.

In 1955–58 dithane at 3 kg. ha. and Cu compounds at 5 kg. ha. were applied to pine plantations invaded by *Lophodermium pinastri* [**37**, 744] by hand- and motor-sprayers, rain-guns, and by helicopters and aeroplanes in succession, the last 2 methods at a considerable reduction in cost. The applications were made in the 2nd half of July and also sometimes in Aug. each year. Using a 4 grade scale (1–healthy, 2–infection just noticeable, 3–distinct, 4–total), the untreated areas in 1957 were evaluated at 2·8, those treated once at 2, and those treated twice at 1·5. Single treatment of 476 ha. and double treatment of 355 ha. in 1957 ensured 71 and 91% absence of visible symptoms, respectively, in 1958, the failures being largely due to the use of Cu compounds.

Ganzha (R. V.). О шляпочных грибах и запасах съедобных грибов в Сосновых лесах Полтавщины. [On the cap fungi and reserves of edible fungi in the Pine forests of the Poltava district.] —*Bot. Zh. S.S.S.R.*, **44**, 2, pp. 193–197, 1959.

Collections by Dept Bot., Poltava pedagogical Inst., over a 5-yr. period, in the pine forests of the valley of the river Vorskla, totalled 143 spp. (35 gen.). Details are given of the mycorrhizal fungi noted.

Shemakhanova (Mme N. H.). Условия образования микоризы с **Boletus luteus (Linn.) Fr.** в чистой культуре. [Conditions for the development of mycorrhiza from *B. luteus* in pure culture.] —*Bull. Acad. Sci. U.R.S.S.*, *1960*, 2, pp. 240–255, 4 fig., 7 graphs, 1960. [Engl. summ.]

At Inst. Microbiol., Acad. Sci. U.S.S.R., Moscow, relatively small amounts of N and P (1:1·6 or 1:3) gave the best mycorrhizal formation between *B. luteus* [**39**, 510] and *Pinus silvestris*. With light at 3593 lux, 7·95 mg. N, and 6·68 and 3·34 mg. P flask glucose was opt. at 2·5 g. l.; pH 5·4 was better than 4·8. Mineral N compounds were more favourable than organic, the best being $(NH_4)_2HPO_4$ and KNO_3. For mycorrhizal formation on conifers the symbiont should be freshly isolated (2 yr. at the most); the culture introduced should be growing actively, not more than 2–4 weeks old, and the seedlings 2 weeks old.

Parker (A. K.). **An unexplained decline in vigor of Lodgepole Pine.** —*For. Chron.*, **35**, 4, pp. 298–303, 6 fig., 1959.

This decline of pole-sized *Pinus contorta* var. *latifolia* near Creston and near the headwaters of the Kettle River, B.C., is characterized by a marked reduction in radial increment, bark lesions, and a general deterioration of the crown. Although *Leptographium* sp. [cf. **36**, 798] was isolated at the Forest Biol. Lab., Victoria, B.C., from many of the lesions sampled, many others were of unknown origin. The relation of *L.* sp. to the disease is similar to that observed between *Europhium trinacriforme* and a similar disease of *P. monticola* [**37**, 381], and the true causal agent remains to be found.

Mielke (J. L.). **Infection experiments with Septogloeum gillii, a fungus parasitic on dwarf Mistletoe.**—*J. For.*, **57**, 12, pp. 925–926, 1959.

The author (U.S. Dept Agric., Ogden, Utah) describes experiments in N. Utah and E. Idaho in which dwarf mistletoe (*Arceuthobium americanum*), parasitic on lodgepole pine (*Pinus contorta*) at 6,600–7,000 ft., was sprayed in 1952 with a spore

suspension of *S. gillii* [cf. **26**, 86; **35**, 335]. The fungus was present in 1953 on the inoculated plants, but was not found in 1956; the summers of 1953 and 1954 were relatively dry, and it apparently died out, indicating that *S. gillii* would be of little use against dwarf mistletoe in this area.

Peterson (R. S.). **Pine gall rust in the Rocky Mountains.**—*Diss. Abstr.*, **20**, 5, p. 1557, 1959.

The damage caused by *Peridermium harknessii* [**39**, 356], particularly to lodgepole pine [*Pinus contorta*: **37**, 320], has become significant in western N. America. Inoculations at Univ. Mich. with aecidiospores on *Castilleja* confirmed earlier reports that this is a 'pine-to-pine' rust, though some field evidence indicates that in the central Rocky Mountains infection of pine normally arises from spores from alternate hosts. In pine the haustoria penetrate most of the cells in the cortex, phloem, cambium, and rays. Aecia arise from a compact stroma in the cortex and phloem, usually 2 yr. after infection. Time of aecidiospore discharge, related to humidity changes, varies by locality, beginning in May or June and continuing for 1–2 months.

Dating the origins of rust galls reveals that only occasional years are favourable to infection of pine. Wave years may correspond to times of abundant June precipitation in the Northwest and to abundant Aug. precipitation in the central Rocky Mountains. Pines of all ages are susceptible, but rust outbreaks in lodgepole pine are usually limited to stands less than 40 yr. old. It is confirmed that the branch-gall rust and that causing swollen cankers on trunks are identical. Cankers arise from primary galls. After the bark dies secondary galls develop; bark above and below also dies, though it is not invaded by mycelium. Usually twice as much xylem is produced by diseased cambium as by healthy. About 32% of rust-infested wood is parenchymatous, in contrast to 6% of rust-free wood. The tangential growth rate of gall rust on lodgepole pine trunks is related to radial growth, making it possible to forecast the time of girdling of individual trees by cankers. Damage to pine is of 2 main kinds: growth losses and mortality due to branch galls, significant locally in the Northwest, and cull due to trunk cankers in other Rocky Mountain areas.

Anderson (N. A.). **Stalactiform rust on Jack Pine in Minnesota.**—*For. Sci.*, **6**, 1, pp. 40–41, 1960.

The elongated, diamond-shaped cankers observed in 1957 in N. central Minn. on mature jack pines (*Pinus banksiana*) were similar to these caused by *Cronartium coleosporioides* on lodgepole pine (*P. contorta*) [**36**, 436]. Inoculation of *Castilleja coccinea* [cf. above] and *Melampyrum lineare* with spores from the cankers resulted in uredia and telia characteristic of *Cronartium coleosporioides* [**39**, 356]. The fungus has apparently not been reported before on jack pine in Minn. or any other State E. of the Rocky Mountains.

Kišpatić (J.). **Pojava rđe na Alepskom Boru u Istri.** [Occurrence of rust on *Pinus halepensis* in Istria.]—*Šumarski List, 1959*, 1–3, pp. 26–38, 4 fig., 1 map, 1959. [Germ. summ. 27 ref.]

A rust heavily invading pine stands in Yugoslavia was identified at the Faculty of Agric. Forestry, Zagreb, as *Cronartium asclepiadeum* [cf. **30**, 87], for which *Vincetoxicum* (probably *officinale*) appeared to be the alternate host. Destruction of pines with affected stems, removal of all infected branches, and extermination of *V.* in the tract concerned are considered necessary for control.

Childs (T. W.). **Elytroderma needle blight of Ponderose Pine.**—*For. Pest Leafl. U.S. Dep. Agric.* 42, 4 pp., 4 fig., 1959.

The appearance of *E. deformans* [cf. **38**, 717] in the Pacific Northwest is described

and its relation to the environment and effect on the host. Silvicultural operations to offset the effects of the disease are outlined.

Linzon (S. N.). **Some associative interactions between Fomes pini (Fr.) Karst. and several hyphomycetous fungi isolated from White Pine.** –*Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.*, **16**, 1, p. 3, 1960.

Of 7 hyphomycetes isolated from healthy phloem of white pine [*Pinus strobus*] 4 were inhibited and partly overgrown in culture by *F. pini* [**37**, 687], which causes decay in living pine [**32**, 651], 1 exhibited mutual inhibition with *F. pini*, and 2 *Alternaria* spp. strongly inhibited *F. pini*. *A.* isolates were incapable of invading white pine wood and are considered to be secondary organisms which may have an important place in the metabiotic series in wood decay. The production of fruiting bodies of *F. pini* is possibly prevented by the invasion of infected trees by hyphomycetes.

Day (W. R.). **Diseases of the crown in Black Pine, Pinus nigra, Arnold. I. Die-back and debility of the crown in Pines in Cyprus, with special reference to P. nigra Arnold, sub. sp. pallasiana Lamb.**—*Emp. For. Rev.*, **39**, 2 (100), pp. 172–184, 1960.

This report, from the Imperial Forestry Inst., Oxford, is based on a survey of the forests of Cyprus by the author in 1956. He describes the circumstances in which dying tops are found and the morphology and anatomy of the dead tops. There is no evidence of infection. Particular interest attaches to phloem necrosis, apparently resulting from physiological stress, which when severe involves the death of the cambium also. Death ensues when a branch or shoot becomes girdled by this process. Top die-back is often encountered in trees with a poor water supply. Tabulated details are given of 17 typical cases; an appendix gives field notes on the associated soil profiles.

Vagin (A. V.). Степень поражения стволов Ели напенной гнилью в лесах Костромской области. [The degree of stump rot infection in trunks of Spruce in the forests of the Kostroma region.]—Науч. Докл. высш. Школ. [*Nauch. Dokl. vÿssh. Shkol.*], Les. Delo, *1959*, 2, pp. 60–63, 1959.

At the October Lumbering Establishment, 'Kostromales' Combine, Kostroma region, U.S.S.R., 1,537 trunks were examined from 28 test sections of spruce plantations; av. infection by [unspecified] stump rot was 10, 23, and 38% at 80, 120, and 160 yr., respectively. The length of the infected area along the trunk increased regularly with age to a max. not exceeding 3·5 m. at 160 yr. There was also some increase in variability of infection, the coefficients of variation being 42% at 60 yr. and 56·5% at 160. The av. relative dimensions of the area of infection on the cut face depended little on age, but constituted 0·2–0·23 of the diam. of the face. The degree of infection, both in length and diam., was independent of the dimensions of the trunk. The length of the infection depended more on the relative dimensions of the rot on the face than on the absolute dimensions. The existence of a correlation between the two dimensions enabled a relationship between the extent and diam. of the infection and age to be established.

Sakurai (Y.) & Matuo (T.). **On the form name and race of Hypomyces solani (Rke. et Berth.) Snyd. et Hans. which is pathogenic to the Mulberry trees.** – *Ann. phytopath. Soc. Japan*, **24**, 4, pp. 219–223, 1959. [Jap. Abs. from Engl. summ.]

On the basis of cross inoculations, using 2 strs. of the *Fusarium* causing blight of mulberries and 6 strs. of *F. solani*, the authors propose *H. solani* f. *mori* Sakurai & Matuo [**37**, 565 and below] as the name for the α str. of the fungus isolated from mulberry.

The β str. also isolated is less pathogenic on mulberry stems but attacks pea seedlings, sweet potato, and especially potato tubers. It is designated *H. solani* f. *radicicola* race 2, as distinct from race 1 which causes dry rot of potato tubers but is non-pathogenic to mulberry.

Sakurai (Y.) & Matuo (T.). **Heterothallism in Hypomyces solani f. mori.**—*Res. Rep. Fac. Text. Seric. Shinshu Univ.* 9, pp. 22–27, 1959. [Jap. Abs. from Engl. summ. 19 ref.]

At the Phytopath. Mycol. Lab. 40 strs. of *H. solani* f. *mori* [see above], collected in various localities in Japan from mulberry trees, were grown from single ascospores or conidia. On the basis of mixed and opposed culturing 10 strs. chosen at random were divided into — and + groups; reciprocal crossing of 8 of these strains demonstrated that 6 were hermaphroditic (3 MF+ and 3 MF−) and 2 unisexually male (M+ and M−). Among the 40 strs. examined 16 were MF−, 16 MF−, 3 M+, 2 M−, and 3 non-reactive.

Matuo (T.), Sakurai (Y.), & Sakai (E.). **Pathological studies of the 'bud blight' of Mulberry trees. V. The relation between the kinds of injury on the Mulberry stem and the infection of the causal fungus, and the change of a few physiological characters of the Mulberry stem with the growth of the Mulberry tree and its pathological significance.**—*Res. Rep. Fac. Text. Seric. Shinshu Univ.* 9, pp. 16–21, 3 graphs, 1959. [Jap. Abs. from Engl. summ.]

In further studies [cf. **38**, 718] the depth of injury in mulberry stems was not correlated with the penetration of the host cells by the bud blight fungus [*Gibberella lateritia*: **39**, 353] except that it increased the area of fungal penetration. The susceptibility of the cells on the surface of old injuries was negligibly greater than of those on new wounds. As compared with resting stems growing mulberry stems contained more water, more solids, and more water-soluble substances, which promote the formation of wound cork, wound gum, and other factors increasing resistance to the fungus.

Matuo (T.) & Sakurai (Y.). **On the fungicidal effect of chloropicrin and other few drugs upon Rosellinia necatrix and Corticium centrifugum in the soil.**—*J. seric. Sci. Japan*, **28**, 6, pp. 395–401, 2 diag., 1959. [Jap. Abs. from Engl. summ.]

At Fac. Text. Seric., Shinshu Univ., Ueda, chloropicrin was more effective against mycelium of *R. necatrix* and sclerotia of *C. centrifugum* in soil than carbon bisulphide or calcium cyanamide. While a dose of 454 g. 9·9 sq. m. chloropicrin was insufficient, 908 g. applied in mid-summer killed the naked hyphae of *R. necatrix*, but not those in mulberry roots [cf. **35**, 647] over 50 cm. deep in the soil. *C. centrifugum* reacted similarly. Chloropicrin was more efficient against naked hyphae of *R. necatrix* in sandy than in clay soil but not against hyphae in mulberry roots. Its effectiveness was enhanced by covering the soil with a vinyl sheet.

Cole (J. R.). **Dodine, an outstanding fungicide for Pecan scab control.**—*Plant Dis. Reptr*, **44**, 4, pp. 251–252, 1960.

At U.S. Dept Agric., Albany, Ga, effective control of *Fusicladium effusum* [cf. **38**, 719], resulting in better retention of foliage and greater nut yield, was obtained by sprays with dodine (cyprex) at 2 lb. 100 gal. On 15 May only 4% of the leaves so treated were infected, compared with 17, 19, 22, and 34% of those sprayed with 2 lb. zineb, 6 2/100 Bordeaux mixture, 2 lb. ziram, and the unsprayed, respectively.

Gilbertson (R. L.). **Studies on the western wood-rotting fungus Poria zonata Bres.**—*Canad. J. Bot.*, **38**, 1, pp. 87–91, 1 pl. (4 fig.), 4 fig., 1960.

P. zonata, reported only from the western U.S. and British Columbia [cf. **36**, 354;

38, 500], where it is widely distributed on recently fallen logs of *Abies grandis*, *A. concolor*, *A. lasiocarpa*, *Larix occidentalis*, *Pseudotsuga menziesii*, and *Tsuga heterophylla*, and the white pocket rot it causes are described.

Findlay (W. P. K.) & Savory (J. G.). **Dry rot in wood.**—*Bull. For. Prod. Res., Lond.* 1 (6th Revised Edition), viii+36 pp., 8 pl. (10 fig.), 4 fig., 1960. 4*s*.

This edition [cf. **32**, 652] includes up-to-date information on the eradication of *Merulius lacrymans*, including recommendations for the use of Na pentachlorophenate and Na orthophenylphenate instead of the less effective Na fluoride and Mg silicofluoride used in the past.

Walters (C. S.). **Problems and practices in wood preservation, 1958–9.**—*For. Prod. J.*, **10**, 2, pp. 73–81, 6 fig., 1960. [2½ pp. ref.]

In this useful survey [cf. **38**, 552] recent developments relating to marine piling, crossties, poles, particle boards and hardboards, housing material, cooling towers, millwork, and boats are discussed. In protection of cooling-tower timbers against 'soft rot' [**39**, 62] a wide range of reactions to preservatives was noticed, due to the action of water, pH, temp., and nutrient requirements. The data obtained from 352 wood-preserving plants (289 with pressure-treating equipment) indicate a general decline in commercial treatments. New protective methods are mostly directed towards removal from wood of certain elements necessary for fungal growth; thus a modification of cellulose by cyanoethylation and a depletion of thiamine were assayed. Of new chemicals mention is made of the preservative and fire-retardant inorganic salt mixture 'osmose PFR'; tributyltin oxide; Cu abietate, protecting against *Poria monticola* [cf. **39**, 253]; and a combination of creosote+2% pentachlorophenol, which is proving effective. Special problems and developments in various parts of the U.S.A. and its dependencies are dealt with under separate headings.

Verrall (A. F.). **Preventing moisture problems in wood siding in the South.**—*For. Prod. J.*, **10**, 3, pp. 148–151, 1 fig., 1960.

In tests at Saucier, Miss., on a frame building, 4 of the southern pine panels were experimentally infected with *Lenzites saepiaria*; half the board ends were soaked in tap water overnight, then placed in contact with infected pine shavings and wrapped in vapour-barrier paper for 10 days. Two panels were inoculated similarly with *Trichoderma viride* (2 hr. soak, 3 wk. contact). All outside surfaces were given 2 coats of exterior white paint and the building was repainted later. Infection at the time of construction increased decay failures from 46% (uninoculated) to 75% (moulded by *T. viride*) and 86% (with incipient decay by *L. saepiaria*, also some mould and stain). Only sound wood should be used; kiln-dried is generally safer than air-dried.

Small (D.) & Jeffers (J. N. R.). **An experiment in the control of blue stain at Thetford Chase, 1957.**—*Emp. For. Rev.*, **39**, 2 (100), pp. 211–219, 4 fig., 1960.

In a field experiment in Thetford Chase forest, East Anglia, freshly peeled and unpeeled logs of Scots and Corsican pine (6 in. top diam. over bark) were brushed with 5% aqueous solutions of santobrite or Na orthophenylphenate in Mar., June, and Sept. Both treatments significantly reduced blue stain [cf. **38**, 107], though not to the degree required by British Grading Rules; at the final assessment there was no significant difference between the 2 treatments. Staining *via* end shakes and splits was more common than that through damaged bark, suggesting that the use of end-sealing compounds would be economic where timber is to be left unconverted in the forest for any length of time. Penetration by [unspecified] hyphae occurred noticeably along the exposed rays on the peeled logs, giving rise to typical

wedge-shaped zones at the end of stained logs. Fungicide should be applied as soon as possible after felling as hyphal development within the timber may continue after the treatment. The percentage surface area stained was less in unpeeled than in peeled logs felled in June and Sept. but the reverse was true for those felled in Mar., possibly due to the protection afforded by the bark during the wet summer months.

Yamamoto (W.) & Maeda (M.). **The effect of some fungicides on the moulds occurring on Bamboos.**—*Sci. Rep. Hyogo Univ. Agric. Ser. agric. Biol.*, **4**, 1, pp. 23–34, 1959. [Jap. Abs. from Engl. summ.]

San nitto (5% bistributyl tin oxide) at 0·002–0·00025%, mertan (5% PMF) and PMF at 0·005–0·0005%, and ruberon (2·5% ethylmercuric phosphate) at 0·002–0·005% completely inhibited germination and growth of 29 mould fungi [**39**, 63] isolated from stained bamboos. Inoculated bamboo slats were sterilized by a 15 min. soak in 0·04–0·008% San nitto and 0·01–0·02% mertan and if soaked before inoculation 0·01–0·0005 and 0·008–0·0005%, respectively, sufficed.

Mycology Branch.—*For. Res. India, 1953–54*, pp. 32–34, 1960. [Cyclostyled.]

It is reported that the lignin-decomposing fungi *Polystictus sanguineus* and *Daedalea flavida* had no selective action in culture on the lignin of bamboo (*Dendrocalamus strictus*) chips but destroyed cellulose in addition to lignin.

An outbreak of *Alternaria* sp. on *Artemesia brevifolia*, reported by the Minor Forest Products Branch, was successfully controlled with Bordeaux mixture.

Forest Pathology and Wood Preservation Branches.—*For. Res. India, 1957–58*, pp. 38–39, 68–71, 1960. [Cyclostyled.]

It is reported [cf. above] that in specimens of coniferous woods treated with ascu [**33**, 458] the depletion of the chemical was very little in durability tests and that sufficient quantities were present even after 24 yr. of service in the test yard.

The majority of chir [*Pinus longifolia*], semul [*Bombax malabaricum*], and mango specimens treated with ascu, creosant, creosote: fuel oil (50:50), and pentachlorophenol, and immersed in sea water in harbours were destroyed in about 2 yr.

Puri (Y. N.), Sharma (R. P.), & Bakshi (B. K.). **Toxic resistance of Poria monticola to copper and zinc in nutrient medium.**—*J. sci. industr. Res.*, **18** C, 8, pp. 149–152, 1959.

At Forest Res. Inst., Dehra Dun, India, 2 isolates of *P. monticola* from decayed pine wood (*Pinus roxburghii*) and 1 from larch (*Larix griffithii*) tolerated high concs. of Cu and Zn (as resinates) and $CuSO_4$ in malt agar and may be used in the evaluation of wood preservatives. The fungicidal concs. of $CuSO_4$ and Zn resinate ranged from 2·2 to 2·6 and from 2·1 to 2·2%, respectively.

Becker (G.). **Beitrag zur Kenntnis der Wirksamkeit von Borverbindungen als Holzschutzmittel gegen Insekten und Pilze.** [Contribution to the knowledge of the effectiveness of B compounds as wood preservatives against insects and fungi.]—*Holz a. Roh- u. Werkst.*, **17**, 12, pp. 484–489, 4 graphs, 1959. [Engl. summ.]

At the Bundesanstalt für Materialprüfung, Berlin-Dahlem, the following threshold values of boric acid [**38**, 634] towards wood decaying fungi (expressed in kg./cu. m. wood) were obtained by the Kolle flask method: *Merulius lacrymans* [**38**, 284] 0·36–0·54, *Coniophora cerebella* [*C. puteana*: loc. cit.] 0·53–0·73, *Lentinus lepideus* [**37**, 563] 0·54–1·4, and *Lenzites trabea* [**38**, 41] 0·52–0·72. Mould growth on pine sapwood blocks which were fully penetrated by boric acid and borax was largely prevented by 2·5% but not by 1% solutions.

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